Chemical Age

A.B.C.M. Packaging Conference at Harrogate

(page 817)

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12 November 1960

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

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INDEX TO ADVERTISERS

The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*

(*Continued on page 796*)

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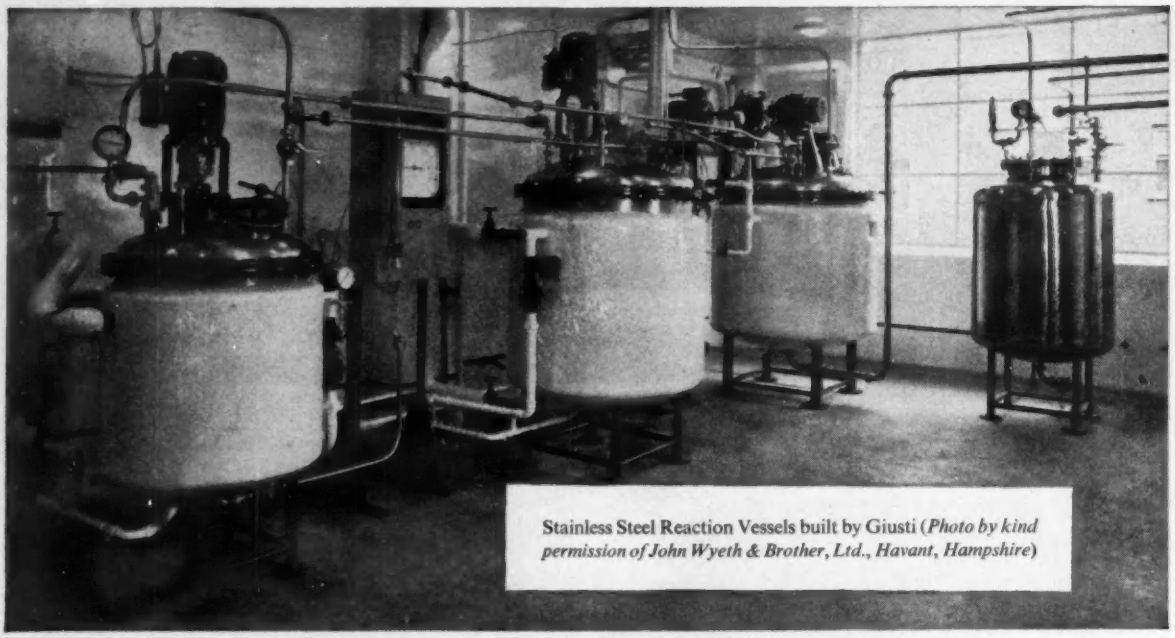
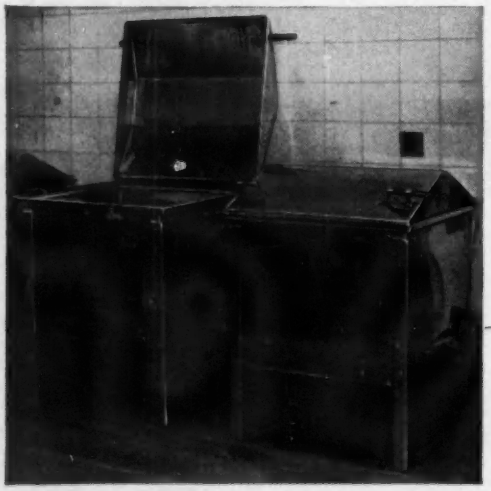


Stainless Steel Reaction Vessels built by Giusti (*Photo by kind permission of John Wyeth & Brother, Ltd., Havant, Hampshire*)

HIGH EFFICIENCY— LONG-LASTING

stainless steel plant by



GIUSTI

Our experience of stainless steel fabrication has been built up over a generation. Practically no job is too specialised for us to produce quickly and at a competitive price.
Also Giusti quality *endures*—another point worth remembering when you next require plant or vessels—either from stock or to your own specification.

A recent photo of stainless steel sterilizers made by Giusti and supplied to the M.W.B. Bacteriological Laboratories 25 years ago. (*Photo by courtesy of the Metropolitan Water Board*)

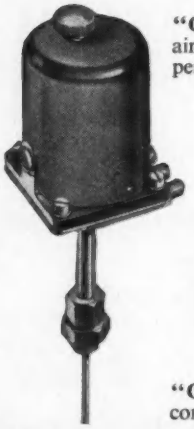
GIUSTI

VESSELS TO A STANDARD OR SPECIALS TO ORDER

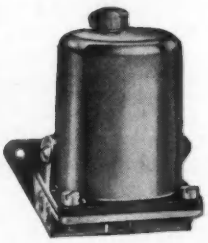
T. GIUSTI & SON, LTD

Belle Isle Works 210/212 York Way Kings Cross London N7 NORth 5021

TRANSMISSION CONTROL



"On plant" mercury-in-steel air-operated proportional temperature controller.
Publication No. R39



"On line" air-operated receiving controller. *Publication No. R31*

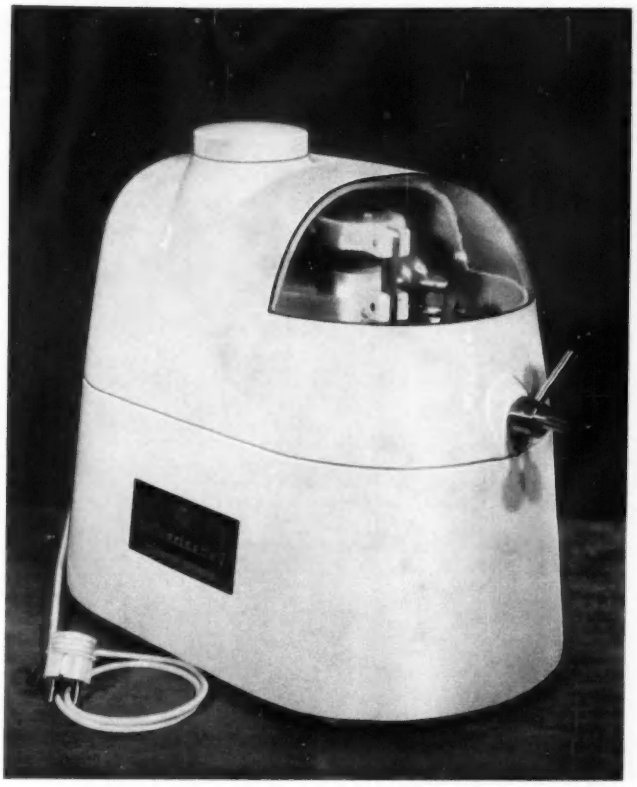
Mercury-in-steel air-operated temperature transmitter
with Polyester resin glass-fibre cover, stainless steel base, stem and bulb. *Publication No. T39.*

High thermal response. Wide range of temperatures.
Standard output air pressure, 3-15 p.s.i. Small and compact.

NEGRETTI & ZAMBRA

The name that means precision all over the world

NEGRETTI & ZAMBRA LIMITED
122 Regent Street, London W.1

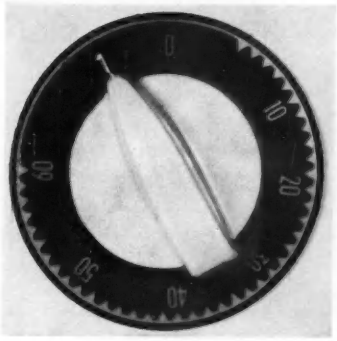


pulverisette2
GERMANY/REG. TRADE-MARK/PAT. PEND.

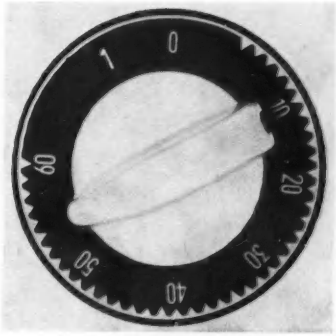
AUTOMATIC UNIVERSAL LABORATORY MILL

(Germ. Fed. Patents applied for)

series-produced with automatic clock at no extra cost:



Continuous timing



Timed at 55 min. pulverising time

For general use in the laboratory for intermittent pulverising of all kinds of material up to analytical fineness (< 60 μ), especially for

- organic and inorganic substances
  - e. g. Medicaments
    - Sugar
    - Aluminia
    - Pigments
    - Silicates
    - Metallic Powders
- all kinds of raw and synthetic materials
  - e. g. Gypsum
    - Lime
    - Enamel
    - Glass
    - Quartz
    - Ceramics
    - Cement
    - Slag
- samples of hard minerals (rocks)
  (up to Mohs-hardness 9 inclusive)
- quality samples of coke and coal
- dustlike and dangerous substances
  - e. g. insecticides
    - fungicides

pulverisette2
GERMANY/REG. TRADE-MARK/PAT. PEND.

Volume: ~ 625 c. cm. (= 38 cu. in.)
Useful capacity: ~ 75-100 c. cm. (= 4 1/2-6 cu. in.)
Maximum intake size of the grains: ~ 4 mm (=1/6")

pulverisette2

GERMANY/REG. TRADE-MARK/PAT. PEND.

AUTOMATIC UNIVERSAL LABORATORY MILL

(Federal German Patents applied for)

The automatic "Pulverisette 2" (fine pulveriser, mortar type with pestle) has been developed with regard to the practical needs of the chemist and has been tested in collaboration with experts in pulverising techniques. It is the ideal Universal Small Grinder for the modern laboratory.

- The grinding pressure on the pestle can be varied up to 9 kg (=20 lbs) by means of a sliding weight so that the hard material to be ground can be pulverised with correspondingly greater pressure and sticky samples with less pressure (Fed. German patent applied for).
- The lining of the mortar basin reaches the upper edge (being thus protected, centered and counterbalanced), mortar doubly covered by a plexiglass lid and plexiglass window. Because of this double cover, there is the possibility of analytically pure and free of loss powdering of mordant, dustlike and hygroscopic samples (in the athmosphere of inert gases). (Fed. German patent applied for).
- Pulverising Time: Large pestle grinding surface of 385 m.m.² permitting quick pulverising. Approximate pulverising time: Samples of 75 c.cm. matter pre-crushed to $<$ 3 m.m. feeding grain, pulverised to analytical fineness ($<$ 60 µ): Rocksalt: $\sim$ 50 min., Quartz sand: $\sim$ 60 min., Coke: $\sim$ 75 min., Carborundum: $\sim$ 90 min, Corundum: $\sim$ 180 min.
- The series-produced apparatus is fitted with a timing clock at no extra cost. After filling with the material to be ground and setting grinding time and pressure the apparatus works automatically without supervision.
- Encased modern and dustproof construction with large plexiglass window permits the observation of the pulverising process.
- Resistance to wear: By using an Agate mortar and Agate pestle the minimum possible abrasion is obtained.
- In contrast to crushing in a hand mortar, the use of a "Pulverisette 2" for fine powdering means proper rationalisation so that the apparatus pays for itself within a short time.

Reference Nr. 200 (D.C. motor 220/380 Volt)
201 (A.C. motor 220/380 Volt)
202 (A.C. motor 110 Volt)

pulverisette2
GERMANY REG. TRADE MARK PAT. PEND.

mounted round mortar, outer ⌀ 180 m.m., inner ⌀ 135 m.m., with pestle 70 m.m. ⌀, built-in three phase gear motor 75 Watt, 220 or 380 Volt (A.C. motor or other voltage on request).

Volume: $\sim$ 625 c.cm. Useful contents: $\sim$ 75-100 c.cm. Feeding grain size $<$ 4 m.m.

Apparatus: net 30 kg (= 66 lbs), measurements: 55 x 30 x 45 cm. (= 22 x 12 x 18")

Wooden Box: gross 45 kg (= 100 lbs), measurements: 60 x 45 x 55 cm. (= 24 x 18 x 22")

Choice of grinding paris
Fitting with hard porcelain grinding parts will do for normal stress. Mortar and pestle made of Brasilian agate recommended if purity of analysis (minimum abrasion) is required or in case of continuous pulverising of samples of hard pulverising materials, because (second to knock-sensitive and expensive hardmetal tungsten carbide), the homogeneous gem agate represents the most solid substance against abrasion.

INTERCHANGEABLE PULVERIZING ACCESSORIES

Ref. Nr. of complete grinding set	Type of Material used for the pulverizing accessories	Abrasion	Mortar in Alu. Mounting		Pestle		Scraper	
			net kg	Ref. Nr.	net gr	Ref. Nr.	net gr	Ref. Nr.
210	Mortar **Hard Porcelain** Pestle Hard Porcelain Scraper Vulkollan	strong	2,5	2101	600	2102	10	2103
220	Mortar **Chromium Steel (Cr-Ni)** Pestle Chromium Steel Scraper Vulkollan	medium	4,1	2201	1800	2202	10	2103
230	Mortar **'AF-Sintered-Sapphire' (Al_2O_3)** Pestle 'AF-Sintered-Sapphire' Scraper Vulkollan	medium	2,9	2301	900	2302	10	2103
240	Mortar **Agate ($Si\,O_2$)** Pestle Agate Scraper Vulkollan	weak	2,8	2401	600	2402	10	2103
250	Mortar **Hardmetal (Tungsten Carbide)** Pestle Hardmetal Scraper Vulkollan	very weak	6	2501	2000	2502	10	2103

Alfred fritsch

Hauptstrasse 542

Idar-Oberstein 1

Phone 2570 (W. Germany)

ELTESOL SX

SOLUBILITY PLUS ECONOMY FOR LIQUID DETERGENTS

Eltesol SX is one of a versatile new range of Marchon hydrotropes with a marked effect on the cost and performance of liquid detergents. It increases solubility of anionic active matter and complex phosphates, depresses cloud-points and allows close adjustment of viscosity . . . in a wide variety of heavy and light duty formulations.

Fully compatible with liquid detergent anionics and non-ionics (e.g. Nansa SS and Empilan MAA), the Eltesols are also invaluable as crisping agents for heavy-duty powders. Please write for technical leaflet.

ELTESOL RANGE (AVAILABLE AS LIQUID OR FLAKE)

ELTESOL SX—	(sodium xylene sulphonate)
ELTESOL ST—	(sodium toluene sulphonate)
ELTESOL PX—	(potassium xylene sulphonate)
ELTESOL PT—	(potassium toluene sulphonate)

Marchon

Marchon Products Limited, Whitehaven, England.

Member of the Albright & Wilson Group of Companies.

Manufacturers of bases and additives for every type of domestic and industrial detergent.

MAR 206

97

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IN THIS ISSUE

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CHEMICAL AGE

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

THE OIL AGE

WHATEVER the pundits may say about gas or coal—or even atomic energy—the second half of the twentieth century will be known as the 'oil age'. The fantastic rise in U.K. demand for oils is due not only to the mounting car population, but also to the big growth rate in the market for jet fuels, for oil-firing in home, farm and industry, for the railways' dieselisation, and for that new post-war industry —petrochemicals. In all of these sectors, the call for oil is still in its infancy.

In 1951, U.K. refinery throughput was 15 million tons of crude a year; last year this had risen to 38.8 million tons. The opening of Britain's ninth major refinery at Milford Haven (see page 815) has added 4.5 million tons to that figure. Last year, the U.K. used more than 36 million tons of oil products (9.5 million gall.), or 14% up on 1958. Britain is second only to the U.S., which accounts for more than half the free-world's total demands of 876 million tons/year, a total that is expected to rise to 1,119 million tons in 1965.

By the middle 1960's, British demand will rise to at least 50 million tons, reaching 57 million tons in the early 1970's. By 1970, our car population is expected to reach 9 million, with an all-vehicle total of 15 million. During a peak summer period that could mean a possible demand for motor fuels of more than 100 million gall./week.

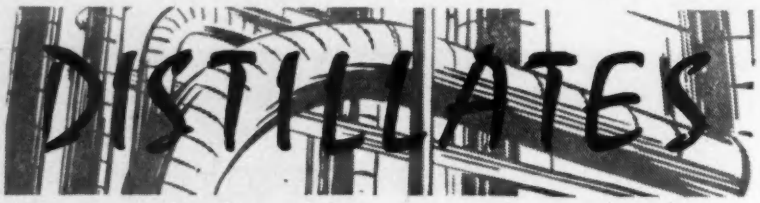
Cars, too, are taking an ever rising percentage of synthetic over natural based components. Oil-based plastics are fast ousting leather in seating and metal in dashboard fascias, and elsewhere. Synthetic rubbers will also play a much bigger part in car construction. In 1954, U.K. output of all organic chemicals was some 718,000 tons, of which just over a third was based on oil; last year was well over the million-ton mark and production of petrochemicals more than doubled to take 48% of the total.

The potential for petrochemicals in Britain is only just beginning to be realised. Already the large post-war petrochemical complexes are bursting at the seams. I.C.I. have a vast development programme lined-up for their new Severnside site; British Petroleum are to develop aromatics plants at their Llandarcy refinery and Esso have reached saturation point at Fawley.

If refining operations at Milford Haven are an economic success, the site will develop as a big chemical production centre. Esso have already intimated they would be interested in converting naphtha to olefins, and in producing aromatics and hydrogen. In the case of the latter, the dehydrogenation reaction will recycle four times as much hydrogen as it makes. Main interest in hydrogen is, of course, for ammonia synthesis. The possibility of Esso entering the U.K. plastics field cannot be discounted.

Other calls on oil are rising swiftly and five years from now jet airliners will take twice as much fuel as they do today. Heating oil consumption in private homes alone is expected to rise fivefold by 1965. In 1957, British Railways used 42,500 tons of diesel oil; this has risen to 270,000 tons and is likely to be 20 times up on 1957 by 1964-65—811,000 tons. The gas industry is taking 700,000 tons of gas oil for enriching town gas—the figure should rise to 1.4 million by 1965. Many refineries are also piping refinery gas direct to gas board works.

(Continued in page 818)



★ STRONG gales which hampered construction of Esso's new £18 million refinery in Pembrokeshire, but which did not delay start-up, threatened to ruin the opening celebrations last week. With 70 other journalists I flew to a Naval Air Station in south-west Wales last week to land in an 80 m.p.h. gale that literally blew one of my scientific colleagues off the improvised landing steps of the Viscount.

The same gale wrecked a 30 ft. marquee in which the Duke of Edinburgh and 1,200 other guests were to have lunch. It also tore corrugated aluminium cladding strapped to the tops of finished products tanks, scattering the material over part of the site. By working all day and through the night, the luncheon was set up in the vast engineering workshops.

From then on all went smoothly, despite a severe squall which blew up just as the Duke reached the marine terminal at the end of the 3,500 ft. long jetty. Despite his stormy reception, the Duke was clearly impressed by his visit to Europe's most highly automated refinery.

★ THE pattern of chemical industry is constantly undergoing change and readjustment, ultimately reflecting changes in emphasis in consumer products; few developments provide such a simple illustration of this process as the imminent closing down of I.C.I. Alkali Division's washing-soda plant at Silvertown, near London. In spite of intensified marketing and more attractive retail packaging, washing soda sales have been hard hit by the recent advance of modern synthetic detergents.

So what one side of the chemical industry gains, another loses; this is equally true where the labour situation is concerned, for while new employment has been created by the demand for detergents and detergent raw materials, a number of Silvertown employees will now be looking round for a job. Obviously these situations smooth themselves out in due course; although this fact may be small consolation to the displaced Silvertown employees, they at least have the advantage of several months' warning.

★ I SHOULD like to have a shot at some of the subjects set for 1959-60 B.Sc. theses in the chemical engineering course at Birmingham University. I should not care to tackle a 'Historical review of the development of the concept of fugacity' and I am not sure that my mathematics would stand up to 'The application of finite difference and matrix algebra and calculus to the solution of a stagewise process.' But 'The stability of froth' seems to offer an excuse for quiet contemplation in wholly congenial surroundings. In attempting to summarise 'The production of non-toxic town gas (with an estimate of the costs of gas production)' it seems to me that, in these days of rapid innovation in the gas industry, a crystal ball might be more useful than a slide rule.

'Chemical engineering and the laws of Great Britain' offers plenty of scope for the imagination, if you assume at the outset that chemical engineers are a pretty lawless lot to start with. The subject of 'Chemical sales engineering' seems intriguing: does the thesis deal with 'How to be a sales engineer in a chemical firm,' or how to 'engineer' increased sales of chemicals? I suppose it all amounts to the same thing.

The real 'plum' subject out of the whole batch is, of course, 'The exploration of response surfaces,' but I am afraid that, in spite of the success of one publisher in a recent, much-publicised court case, no thesis on this subject can appear in CHEMICAL AGE.

★ IN this age of plastics when we tend to accept new materials as a matter of course and show no surprise at the spectacular properties claimed for them, it is a change to hear of a material as old as recorded history being put to a dramatic new use.

Until a few weeks ago, felt, manufactured from high quality wool, was used only in processes where its softness and durability made it pre-eminent. Now, a research team of the Hart-Ashworth Co., Dundee, a subsidiary of S. Hubbard Ltd. of Luton, have hit upon the idea of hardening felt chemically and making use of its pliability and resilience to produce a strong, light and, above all, flexible crash helmet.

Twenty separate manufacturing processes go in to the production of the new helmets and because of the high safety standards required (each helmet has to pass the B.S.I. test), they take up to four days to complete.

The soft felt hoods are first hardened by steam and friction before being soaked in sulphuric acid solution. Bumping on special machines brings out the felt quality of the wool and enables the hoods to be tip stretched and roughly formed. From there the formed hoods go into an oven for drying at 210°C. The next stage is proofing in a solution of water, shellac, resin and borax. Further rough forming and oven drying at 160°C follow, when the hoods are finally blocked to shape.

★ THE radioisotope Gallium-68 is being used to 'tag' particles of coal in experimental equipment for creating synthesis gas from coal at the U.S. Bureau of Mines centre at Morgantown, W.Va. Gallium-68 has a half-life of only 58 min. and loses its radioactivity in a few hours, the Bureau commented. Thus, hazards are held to a minimum, no residue remains to contaminate equipment or products of the gasification process, and there is no disposal problem.

The Gallium-68 is made by the Bureau from another isotope, Germanium-68. Prepared by solvent extraction, Gallium-68 is in liquid form. A few drops are dried on to a coal sample and the tagged particle is ready for its journey through the gasifier. Its progress is traced readily from the energetic gamma rays which pass through heavy pipe walls to detecting devices logging its passage.

★ EMERGING from a café in the town of Hardenberg, Holland, after a glass or two of schnapps, a local inhabitant was intrigued to see, appearing round the corner of a building, a man carrying one end of a large plastics pipe. Two yards behind him came another, who was of course carrying the other end of the —no, wait! A third man appeared, then a fourth, fifth, and so on without end, all carrying the same pipe. The bystander, with a muttered "Well, I'll be a Dutchman!" dived back into the café.

Had he stayed to take note, he would have counted 55 men, but only one pipe —350 ft. of it in fact. It was being moved from the factory of Wavin, the plastics firm who made it, to the nearby goods yard, for shipment to the N.A.M. oil-producing company, who will use it to drain off salt water produced with the oil from their wells near Rotterdam. The pipe was made in one piece to prevent possible leakages. And how else can you move a 350-ft. length of 7 in. diameter pipe but by getting 55 men to carry it?

Even before it started on its 150-mile rail journey in nine specially equipped trucks, the pipe created plenty of problems. At the factory a hole had to be knocked in the wall as the pipe grew longer. Before it finished it stretched right out of the factory grounds, over a hen-run and into a barley field.

I wonder what would have happened if, when it arrived at its destination, the customer had said: "But we didn't order this!"

Alembic

Project News

British Celanese to Enter Aromatics with A.P.V. Benzene Plant

NEW entrants to the aromatics field in the U.K. are to be **British Celanese Ltd.** of the Courtaulds Group, due on stream in August next with nitration grades of benzene and toluene and 3° xylene. Capacities and cost are not revealed; site of the plant will be a new aromatics condensate separation unit at Spondon, Derbyshire. Part of the output will be for captive use by the Courtaulds group; substantial quantities will go to outside sale.

Chemical Engineering Division of the **A.P.V. Company Ltd.**, Crawley, the main contractors, are now designing the plant and will erect it. The unit will incorporate a cyclopentadiene recovery plant operating to British Celanese process design. A.P.V. will also handle civil and electrical engineering as well as commissioning.

A.P.V. have had much experience in this field and in the early part of this year their benzole defronting unit for nitration grade benzole and toluole, plus xylole, was commissioned at Scunthorpe for Appleby-Frodingham Steel Co. Throughput of crude coke-oven benzole is 5.5 million gall/year. The A.P.V. unit has also been installed for the Lincolnshire Chemical Co.

The process, a low-cost high-yield method that was referred to in CHEMICAL AGE, 24 September, page 506, can handle feedstocks from aromatic condensates as well as derived from naphtha cracking feedstocks from aromatic condensates derived from naphtha cracking as well as from coke-oven benzole.

Fraser to Handle New-Process Phosphoric Acid Plants

● NEWS has now been officially released of two complete phosphoric acid contracts awarded recently to **W. J. Fraser and Co. Ltd.**, Harold Hill, Essex. These are for two new U.K. fertiliser projects, but the clients are not named.

Each plant has a design capacity of 1,500 tons a year of 30% P_2O_5. Both plants will utilise the new single reaction tank process which is a joint development of Union Chimique Belge (U.C.B.) and Compagnie de St. Gobain. Fraser's hold U.K. and Commonwealth rights for this and other important St. Gobain processes.

Winston Sell £15,000 Worth of Beryllium Monitors Abroad

● EXPORT orders totalling £15,000 have been received from the United States, France and Japan, for the beryllium monitor manufactured and marketed for Winston Electronics Ltd., Shepperton, Middlesex, and developed by the U.K.A.E.A. The equipment described in CHEMICAL AGE, 27 February, p. 362, detects and automatically records the quantity of beryllium dust in workshops where beryllium metal and its alloys are worked. The very minute quantities of beryllium in the atmosphere are spectrographically measured at one-minute intervals.

Nylon Tyre Cord Plant Contract Placed

● **High Polymer and Petro-Chemical Engineering** has signed a contract for a nylon tyre cord plant with Strojimports and Polytechna, of Prague, Czechoslovakia. The contract is worth approximately £1 m.

The equipment will largely be manufactured in the U.K. by Vickers-Armstrongs (Engineers).

A.P.V. Equipment for B.H.C. Grangemouth Plant

● THE **A.P.V. Co. Ltd.** are to supply distillation columns, heat exchangers and other process vessels for the new methanol plant to be constructed by Chemico for British Hydrocarbons Chemical Ltd., at Grangemouth, and which is scheduled to be completed in 1961.

Gas Cleaning Contract for Chemico

● CONTRACT to supply a complete gas cleaning plant has been awarded to **Chemical Construction (G.B.) Ltd.** by Gutehoffnungshutte (GHH) to be used in conjunction with the oxygen steel-making rotor furnace GHH are supplying to Richard Thomas and Baldwins at their Redbourn works in Scunthorpe, Lincs. This project will be the first application of the Chemico P.A. Venturi Scrubber in the U.K. for the elimination of iron oxide fumes from an oxygen steel-making plant, although Chemico have at present six similar type installations abroad and several others under construction.

The gas cleaning plant will handle 106,000 c.f.m. of saturated gas and includes a filtration plant for the removal of solids from the scrubbing water. It is expected the installation will be in operation early in 1961.

Cubitt's to Build Ilford's Extension

● A FURTHER extension to **Ilford Ltd.'s** £1¼ million factory at Basildon is to be built by Holland & Hannen and Cubitts (Great Britain) Ltd. The single storey extension which will be used for additional storage and warehouse accommodation will cover an area of 120 ft. by 200 ft. and comprises three 40 ft. bays.

Basildon Development Corporation architects have designed the project in collaboration with the Engineering Department of Ilford Ltd.

Construction Proceeds on Dow's Zoamix Plant

● CONSTRUCTION work is now proceeding on the plant of **Dow Agrochemicals Ltd.** to produce Zoamix coccidiostat at King's Lynn, Norfolk, alongside the Dowpon (selective grass weed killer) plant. Plans to manufacture Zoamix at King's Lynn were mentioned in CHEMICAL AGE, 9 July, p. 55, when reporting the completion of the Dowpon plant. Contract for the construction of the Zoamix plant has been let to Constructors John Brown (who constructed the Dowpon plant), the actual building to be carried out by Kyle Stewarts. Production is scheduled to start early in 1961.

Matthew Hall Awarded Contract for Witco Latices Plant

● MATTHEW HALL AND CO. LTD. have been awarded the contract for the synthetic rubber latices project of Witco Chemical Co. Inc. and the United States Rubber Co., to be built in the Midlands and operated by **Sto-Chem Ltd.**, a new company formed by Witco and U.S. Rubber. First news of this £1 million project was given in CHEMICAL AGE, 24 September, p. 421, when it was mentioned that technical assistance for design and construction of the new plant will be provided by U.S. Rubber's Naugatuck Chemical Division. Value of the Matthew Hall contract is not being revealed at present.

Simon-Carves Tackle New Chemical Engineering Contracts

NEWS of a number of important new orders and contracts has been released by Simon-Carves Ltd., Cheadle Heath, Stockport, since the company's current engineering and construction activities were summarised in CHEMICAL AGE, 24 September, p. 502. Orders received in recent months include a 207 tons/day sulphuric acid plant with sulphur melting and filtration equipment and oleum plant for Industrias Quimicas Argentinas Duperial, a 200 tons/day sulphuric acid plant for Eerste Nederlandsche Cooperative Kunstmestfabriek in Holland, a 50 tons/day acid plant for Century Rayon in India, and a 10,000

tons/year polythene plant for Organsko Kemiske Industrija in Yugoslavia. A 150 tons/day sulphuric acid plant and a Prayon phosphoric acid plant have been ordered for the East India Distilleries fertiliser factory. This last order has been placed through the Gasification and Ammonia Fertilisers Department, which is reported to be dealing with a large volume of inquiries from home and overseas (including the U.S.S.R.).

At Margam, erection of the hydrorefining plant for the Port Talbot Chemical Co. is nearing completion. New orders for coke oven and by-products plant include an extension at Brookhouse for the United Coke and Chemical Co., and a biological effluent plant for Texas Instruments at Bedford.

The coke oven by-products plants for Australian Iron and Steel Co. at Port Kembla were mentioned in the 24 September issue; this contract, placed with Simon-Carves (Australia), includes a naphthalene purification plant and a Wilton tar distillation plant which will be Australia's first continuous and fully automatic tar plant.

For the gas industry, the extensive reconstruction of the Northern Gas Board's plant at Hendon is now "substantially complete," while erection of the concentrated ammonia liquor plant for the Southern Gas Board at Hilsea, Portsmouth, is well advanced. Recent orders include mist precipitation equipment for the gas cleaning plant extension for Laporte Titanium at Stallingborough. The ash handling plant for the Distillers Co. at Hull has been completed.

New World Trends in Chlorine Production and Consumption

OF all the basic chemicals, few have had such an erratic career as chlorine, which, once an embarrassing by-product of the production of caustic alkalis by brine electrolysis, is now more in demand than caustic alkalis. Whereas at the beginning of this century ways were sought of converting by-product chlorine to hydrochloric acid, today waste hydrochloric acid is processed to give chlorine.

This paradoxical picture is drawn in a recent issue of the *Review* published by Ciba Ltd., in Switzerland, in which figures are quoted which suggest that a fundamental structural change has occurred in the chlorine industry over the last 30 years. Thus, in 1919, total world output of chlorine amounted to only 150,000 tons, but between 1925 and 1950 annual world consumption increased about tenfold. In 1950 the U.S. produced over 2 million tons, while in 1959 the U.S. figure fell just short of 4 million. Daily capacity of all U.S. chlorine plants put together doubled between December 1951 and December 1959 and stood at 14,000 tons at the beginning of 1960.

Annual chlorine production in western Europe may be estimated at close on 2 million tons, West Germany leading with about 600,000 tons, followed by the U.K. and, at a distance, by France, whose figure in 1959 was 275,000 tons.

Similar dramatic changes have been evident in the pattern of chlorine consumption. In 1925, 65% of the chlorine on the market in the U.S. was taken up by the paper industry, 22% went into textile processing, 10% was required for public health uses, while only 3% was utilised in the chemical industry. By contrast, the chemical industry in 1948 accounted for 77% of chlorine output (for chlorinated organic products, etc.), the pulp mills taking 11% for bleaching, the textile industry 4% and sanitary uses such as disinfection and sterilisation together with various other industries making up the balance of 8%.

The fact that the demand for caustic alkalis has not kept pace with chlorine consumption lends added point to current endeavours to develop chlorine manufacturing processes which do not entail simultaneous alkali production. For instance, chlorine might be obtained as a by-product in the electrolytic extraction of metals, zinc chloride solutions being a case in point. Another possible means are purely chemical processes such as oxidation of the hydrochloric acid by nitric acid (nitrosyl chloride method).

Two New Phosphate Ships Ordered by Marchon

TWO MORE phosphate rock carrying ships, each with a capacity similar to that of the *Marchon Trader*—about 2,300 tons—have been ordered by Marchon Products Ltd. from Clelands of Wallsend-on-Tyne. Improvements based on experience gained with the *Marchon Trader* have been incorporated in the design of the new ships, delivery of which will be at the turn of 1961-62.

Creep Testing Machine Has Chemical Plant Applications

A COMPACT creep testing machine which has been designed by the research and development department of The United Steel Companies Ltd. is expected to have many applications relating to the design and manufacture of steel parts for certain types of chemical plant as well as for steam boilers, steam turbines and gas turbines.

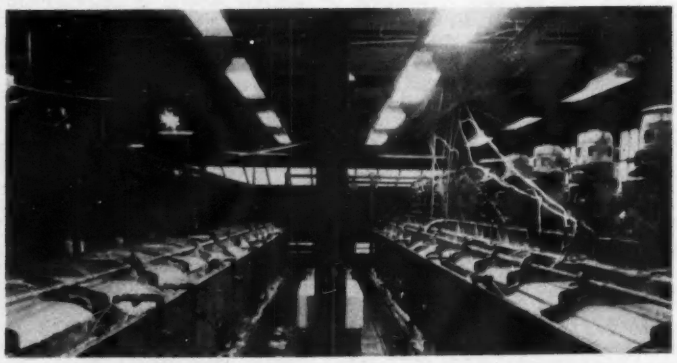
Now being built and marketed by Distington Engineering Co. Ltd., Workington, Cumberland, the machine is designed to accommodate either four high-sensitivity tests or 12 stress-to-facture tests on the one machine, with one furnace and one temperature controller. A special feature of the machine, which is known as the Unisteel, is the concentration of a number of testing stations within a comparatively small space. It occupies a floor space of only slightly more than 1 sq. yd.

Laporte Industries Acquire Cupola Mining and Milling Co.

LAPORTE INDUSTRIES LTD. have purchased from Head Wrightson and Co. Ltd. the whole of the issued capital of The Cupola Mining & Milling Co. Ltd. The price is not disclosed.

The Cupola company is engaged, principally, in the treatment of fluorspar and barytes, and Laporte intend to meet the rising demand for acid grade fluorspar by expanding production at the flotation plant at Stoney Middleton, Derbyshire, which has recently been installed by Head Wrightson.

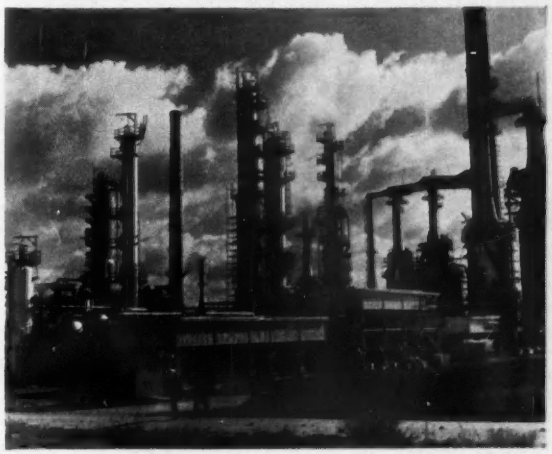
The operations of the Cupola company will be integrated with those of Glebe Mines Ltd., another Laporte subsidiary engaged in similar operations in the same area.



Flotation cells at Glebe Mines Limited, Eyam, Derbyshire, where fluorspar, barytes and lead are separated from the ore

MILFORD HAVEN PETROCHEMICAL HOPES

May Develop on Similar Lines to Fawley



General view of the Milford Haven refinery

THE £18 million Milford Haven refinery of Esso Petroleum Co. Ltd. will probably develop along the same lines as the company's Fawley facilities. Key to the development of petrochemical facilities in Pembrokeshire is the economic production of feedstock at prices that would offset the site's geographical disadvantage.

This need for low-cost, high-yield output is why the refinery is one of the worlds' most highly automated.

Total employment force is about 350, of whom only 25 are responsible for process control. Capital invested represents some £52,000 per employee, compared with about half that at Fawley.

Output will build up gradually to the rated annual capacity of 4.5 million tons and this capacity will, it is thought, meet Esso's needs for five years. The company has hopes of expansion before then in supplying feedstock for petrochemicals. Production of, say, 40,000 tons a year from virgin naphtha would only take about 5% or 6% of the total volume of naphtha. Petrochemical possibilities mentioned by Mr. A. C. Pearce, Esso's general manager of refining, before the plant was opened last week by the Duke of Edinburgh, were the cracking of naphtha, production of aromatics and the conversion of refinery gas to hydrogen.

At present there are no definite petrochemical plans for the new site, although the company was stated to be in almost constant touch with firms. Esso market research, too, is taking into account the developments by the company's potential customers. Mr. E. Asquith, refinery manager, stated last week that with only 375 acres developed out of a site of 1,200, Esso would be able to reproduce the Fawley complex at Milford Haven. He added "There is no question that if production operations are successful we shall be building further plants to meet market depends."

Major expansions currently in hand at Fawley include a second steam cracker to produce ethylene, propylene and butadiene. On completion at the end of next year this will be the largest plant of its kind in Europe and will pipe ethylene to I.C.I. Severnside for the production of ethylene oxide. A new lube-oil additives plant due on stream next month will replace a smaller unit and raise capacity two-and-a-half times to 11,000 tons/year. Contractors for these plants are Foster Wheeler Ltd., who it is thought may build the new butyl rubber plant which is due for completion at Fawley with 30,000 tons/year capacity by 1962-63. Fawley refinery, initial throughput of which was 6 million tons/year and which is now 10 million tons/year, cost £30 million to construct and represents an investment today of £70 million.

Esso have no immediate plans to enter the plastics field in the U.K., although the Standard Oil of New Jersey subsidiary, Humble Oil, are in this field in the U.S. On this point, Mr. Pearce last week stated that Esso researchers were working on new products and he was hopeful for the future. One product, polypropylene, was out of the question in the U.K. however because of the patent position.

Official opening of the new refinery was marked by the Duke of Edinburgh unveiling a relief bronze plaque symbolising a refinery constructor, which was the work of Miss Dora Gordine. Before the unveiling, Mr. H. C. Tett, chairman and managing director of Esso Petroleum, in an introductory address paid tribute to the main contractors, Foster Wheeler, who built the Fawley refinery and who, he added, "made the lowest bid" for Milford Haven.

The ceremony was attended by more than 1,200 guests, including representatives of Government, the Church, industry, the local community and the workpeople at Milford Haven. At a luncheon following the opening. Mr. M. J. Rathbone, president of Standard Oil (New Jersey), proposed the toast 'Our Guests' and Mr. Richard Wood, Minister of Power, replied. Mr. Tett then presented the Duke of Edinburgh with a cigarette lighter—a model of an LPG sphere.

Refinery Uses Latest Air Cooling Techniques

THE refinery, of the hydroskimming type, came on stream in September, but is not yet fully operational. The Powerformer is due to start-up at the end of November. The following is a description of the process units.

Crude Distillation. The atmospheric distillation unit is designed to process 100,000 b.p.s.d. of Middle East crude with three basic types of operation. Crude oil is preheated in an exchanger train before passing to the pipestill furnace, the largest cabin type in Europe. Fabricated by Foster Wheeler, it has a heat release of about 465 million B.Th.U./hr. The crude is then flashed into the atmospheric column, which is divided into four sections; three for fractionation and one for stripping. Overheads are condensed and pumped to the Powerformer feed splitter where the heavy naphtha is drawn off to tankage or as Powerformer feed. The splitter overheads are further treated depending on the light ends products required. Each of the four sidestream cuts passes through a sidestream stripper before cooling. The first sidestream is used partly for Powerformer feed and partly as feed to the copper chloride treating plant. The second sidestream is either combined with the third as a gas oil fraction or combined with the first and passed to the copper chloride plant. The third sidestream goes to the gas oil fraction which is used as gas oil Hydrofiner feed or as high sulphur gas oil product. The fourth sidestream forms a heavy gas oil fraction. The pipestill bottoms, after having given up heat in reboiling and preheat exchangers, go to blending and heavy fuel oil storage facilities.

Copper Chloride. The copper chloride sweetening unit has two streams in parallel, one for processing light virgin

naphtha and the other for heavy virgin naphtha. The light naphtha stream is designed to treat 7,880 b.p.s.d. from the light ends section. The feed is given a caustic wash with 5° Bc caustic, electrically coalesced, and then preheated with steam before being passed to the copper chloride contractors. The contractors are of the fixed bed type and oxidise any remaining mercaptans in the feed. The light naphtha is finally water washed and pumped to tankage. The heavy naphtha stream is similar in arrangement, but handles four different feeds, the maximum being 14,900 b.p.s.d. from the pipestill. In addition to the treatment described for the light naphtha, the feed is dried in a salt drier after the caustic wash and after passing through the contractors it can be given a final caustic wash which contains 16 wt.% sodium sulphide. The heavy naphtha is finally electrically coalesced and passed to tankage.

Hydrofining

Gas Oil Hydrofiner. Designed to desulphurise a maximum of 16,500 b.p.s.d. gas oil, the Hydrofiner takes its feed from the pipestill gas oil cut. This unit depends on the pipestill for its feed and the Powerformer for its treat gas, though if the Hydrofiner is shut down, it does not effect the operation of the other two units. Also incorporated is a high sulphur gas oil drier, which allows high sulphur gas oil from the pipestill to be dried having by-passed the Hydrofiner. The Hydrofiner product drier can also be utilised for this service should the Hydrofiner be shut down. Desulphurisation catalyst is Commox cobalt molybdate, produced by Peter Spence and Sons.

Catalytic Reformer. The catalytic reforming unit is based on the Esso Model II semi-regenerative Powerformer, and included in the plant are a naphtha Hydrofiner, light ends fractionation and caustic wash equipment, a rerun tower and catalyst reactivation facilities. It has been designed to reform 14,900 b.p.s.d. of light and heavy naphtha blends. Built at a cost of £3.25 million, the Powerformer will at full capacity require £1 million of the chloro-platinic acid catalyst, supplied by Ketjen.

The feed is first Hydrofined to remove undesirable organic sulphur compounds, which are converted into hydrogen sulphide, and as such stripped out in a stripper column. The bottoms from this column are debutanised and then passed into the reforming circuit. There are four fixed bed reactors which contain a platinum catalyst, and the feed is passed through each, having been preheated by feed-effluent exchangers and finally by a fired heater before passing to the first reactor. As the reaction is endothermic a reheater is necessary between the first and second reactors and the second and third. The gas produced by the reaction is split into two streams, one going to the stripper column, the other to the recycle gas compressor, where it is recompressed and passed back to mix with the feed. The catalyst in the reactors becomes gradually less active and provision is made for the catalyst in each reactor to be periodically reactivated.

The liquid product from the reaction section is stabilised and passed through a caustic wash tower to a depropaniser column where LPG products are drawn off to storage. The bottoms from the stabiliser go to a rerun tower where the light and heavy powerformates are obtained.

Gasoline Blending. Three motor blends are produced with an in-line blending system. A continuous leading system is used which employs the weigh tank method of control, supplied as a package unit by Associated Ethyl. A quantity of gasoline is drawn off the blending heater and mixed in an eductor with tetraethyl lead. Provision is also made for the injection of dyes and additives as required. There is no intention to use tetra-methyllead, as Esso do not believe it holds any advantage for their blends.

The Fisher Governor Co., a member of the Elliott-Automation Group, supplied the specially designed in-line fuel-blender, which differs from the standard Fisher blending unit used in other refineries in that the balancing unit has been designed to ensure that a product line is never shut off completely.

Fisher Governor also supplied nearly 200 automatic diaphragm-operated control valves. Thirty-nine Fisher Level-Trol liquid level controllers varying in size from 7 to 60 in. were also supplied.

Air Coolers

Air Cooling. A unique feature of the refinery is the exclusive use of air cooling for the process units. Studies indicated that air cooling was more economic than salt water cooling taking into account initial capital costs and annual operating costs. All Air-fin coolers are of the forced-draft type and are fitted with either fixed or variable pitch fans. The fan blades (7 to 12 ft. long) are aluminium or steel with an epoxy resin coating. The air coolers which have pedestal-mounted electric motor drives were supplied complete by Spiro-Gills Ltd.

Instrumentation. Fully automatic tank gauging is provided throughout the refinery, and remote readings are transmitted to a central control house. Where tanks are customs tied they are equipped with averaging resistance thermometers and electronic type auto gauges, and the remainder have float type automatic gauges. Four men handle level control for the 69 storage tanks, most of which have floating roofs, and the four LPG spheres. Level control at Fawley calls for a labour force of 100.

Milford Haven is one of the most highly automated refineries in Europe and the process unit controls are all integrated on one control panel which has a graphic frieze depicting the process flow.

Marine Terminal. One of the factors influencing the choice of the site was the availability of a deep water anchorage capable of handling super tankers up to 100,000 d.w.t. The marine terminal consists of a 3,500 ft. long approach trestle with a tee-head having an overall length of 2,300 ft. It was built by John Mowlem and Co. Ltd.

Storage Facilities

Tankage. Crude oil storage is provided by nine floating-roof tanks 150 ft. diameter by 54 ft. high having a total capacity of 1.5 million barrels.

Each tank is fitted with two 25 h.p. side entry mixers supplied by L. A. Mitchell Ltd. to ensure a uniform feed to the crude unit. There are 23 intermediate storage tanks and 27 product storage tanks. Tankage contractors were Whessoe Ltd., Motherwell Bridge and Engineering Ltd., and Wm. Neill and Sons (St. Helens) Ltd.

LPG storage is provided by seven horizontal drums 10 in. diameter by 110 ft. long which will hold 10,000 barrels of propane, two spheres 52 ft. diameter and for light gasoline blend components two spheres of 36 ft. diameter. The total storage capacity of the refinery excluding 10 utility tanks is over 5 million barrels.

Utilities. The steam generating plant consists of two Foster Wheeler drum natural circulation type boilers fired by oil and refinery gas under balanced draft conditions. Each boiler is designed to give a maximum evaporation of 130,000 lb. steam per hour at 450°F with a design pressure of 160 p.s.i.g. at the superheater outlet.

Four Alley and McLellan reciprocating compressors delivering a combined total of 4,500 s.c.f.w. at 125 p.s.i.g. Three of these compressors are electric motor driven and one has a steam turbine drive. Stepped control with automatic loading and unloading is provided to cater for the fluctuating refinery air requirements.

Effluent Disposal. Apart from economic reasons the decision to use Air-fin coolers was influenced by the fact that the refinery effluent is more likely to be oil contaminated if the conventional water cooling system was used. The small amount of waste water from pump cooling circuits, together with rain water run off from the paved areas, is processed through a conventional A.P.I. separator. Clear effluent from the separator runs into a skimming pond, which is fitted with a skimmer to remove any traces of oil that are still present. The clean water is then discharged through a 48-in. effluent line into the Haven.

Oil tankers have their ballast water pumped into two ballast water storage tanks. After settlement, the oil is skimmed off and pumped to the refinery slop tanks and the clear water is discharged into the skimming pond.

Ground Flare. The safety valve relief and blowdown system is conventional except that a ground flare has been used instead of the more usual elevated type flare. This ground flare is of the multi-jet type designed to burn 15 m.m.s.c./s.d. with a smokeless and non-luminous flame.

Construction. Foster Wheeler set up their site organisation at Milford Haven early in 1958. At the peak of construction early in 1959 the total labour force was 3,500 men. Site preparation was by George Wimpey. Faced with arduous conditions during construction which included gales of over 100 m.p.h. the contractors had difficulty in maintaining progress, but the refinery still went on-stream according to schedule in September.

For and Against the 'Orthodox' Package

Lively Discussion at A.B.C.M. Harrogate Conference

Seen here at the A.B.C.M. conference are, left to right: Mr. M. Crass, secretary-treasurer of the U.S. Manufacturing Chemists' Association; Mr. G. H. Edwards, Unilever Ltd.; Sir William Garrett, A.B.C.M. chairman; Mr. M. J. C. Hutton-Wilson, chairman of Associated Chemical Companies Ltd.; Mr. J. C. Christopherson, director, Albright and Wilson (Mfg.) Ltd.; Mr. C. C. Hazelwood, Metal Containers Ltd.; and Mr. L. Stubbs, sales director, Albright and Wilson (Mfg.)

SOME novel ideas for the shipment of chemicals—including conical drums, paper sacks divided into sections, delivery of phenol in solid blocks packed in foil, and the use of ships' tanks for carrying corrosive liquids—were put forward at the second packaging conference organised by the Association of British Chemical Manufacturers. This conference, a sequel to the successful convention held at Buxton in 1958, was held at the Majestic Hotel, Harrogate, from 31 October to 3 November, and was attended by some 150 delegates. One of the highlights was a lecture by an American guest, **Mr. M. F. Crass,** secretary-treasurer of the U.S. Manufacturing Chemists' Association, on the organisation and operation of his association's packaging and transportation activities. **Sir William Garrett,** chairman of the A.B.C.M., was the principal speaker at the conference dinner on 2 November.

Springboard for the discussion was provided by a paper presented by **Mr. R. Morris** (technical director, Joseph Crosfield Ltd.) entitled "Is the Orthodox Package Obsolescent?" There was no such 'animal' as the orthodox package, Mr. Morris argued, and went on to say that the final specification of a new package should include a proper balance of protection, sales appeal, cost and ease of handling. The assessment of the balance was complex, and the final decision had to be a compromise. There was, however, another factor: time. The ideal package should give adequate protection at low cost, have proper handling characteristics with adequate sales appeal, all at the proper time.

Packaging was just a part, but an important part, of the whole management operation. Those engaged in packaging had a clear responsibility to advise those engaged in other functions of management of the advantages that could accrue from more detailed attention to the packaging problem. There should be a continual process of investigation of all new packaging developments.

"As a buyer of raw materials, I am not so much impressed with the 'silent salesman' appeal of a beautifully painted drum, of which I must dispose; nor the attractively printed paper bag which I have difficulty in opening, nor again the well-presented hessian bag which I must store and later sell, as I am with the 14-ton bulk fluidised tank car of phosphates or the Cov-Hop of soda ash which I can turn around in a time measured in minutes."

Mr. Morris concluded with a warning against complacency and urged a continual review of packaging methods.

'Conservatism' Charge

Mr. James Pilditch (managing director, Package Design Associates, Ltd.) presenting the case for the unorthodox package, said "You in the chemical industry were the ones who invented most of the new packaging materials, yet you hardly ever seem to use them. You stick like glue to round steel drums, straw-stuffed crates, and all sorts of paraphernalia long since superseded in other industries." He went on to suggest that with the industry's knowledge of chemistry, it might be possible to adapt the products themselves to make them easier to package, store and transport. "Would it not be wonderful if, instead of sending out vast fleets of bulk tankers, you could find some way of sending out some chemicals in their quintessence. What about phenols, for example? Might not the high cost of heating and cooling be alleviated if you could send out solid blocks packed in foil?"

The case for the orthodox package was presented by **Mr. E. Richardson** (design department manager, Boots Pure Drug Co. Ltd.), who pointed out that novelty did not necessarily imply goodness. New types of packaging presented disadvantages no less than conventional ones, and a package that was obsolescent for one firm might be just the thing for another. Glass carboys, for example, were far from obsolescent for companies like his own, which dispatched a few carboys mixed with other goods as a part of a composite order, and which dealt largely on the home market where re-use was a factor. Others might find that a corrugated fibreboard box with plastic inner was better suited to their needs as a container for corrosive liquids.

"The tendency today in striving after something new is to increase the cost of packaging. If you are packaging a dangerous chemical or an expensive or dangerous drug, you may decide that you cannot afford to risk a single breakage or leaker, and spend your money on an elaborate package to protect the goods. But if your product is cement or one of the simpler fertilisers, economics will dictate that you risk a few faulty sacks rather than double or treble the cost of your package to avoid them, and you will require much persuading before you change to a new package."

Opening the discussion on the papers, the Conference chairman, **Mr. G. H. Edwards** (Unilever Ltd.) posed a number of questions. Mr. Pilditch had spoken of the need for a square drum, but what about the need for a conical drum that could be nested when empty? Were the present drums large enough "or can we come nearer bulk packaging with drums?" Did the industry 'boggle' at really large containers? Could the product be used as its own container? Activated carbons, in the United States, were being packed in soluble materials —could that method be extended? Why could not paper sacks be divided in such a way that a measured quantity could be used each time? "The packaging industry is alive," he commented, "but is it kicking enough?"

Three Parties

Mr. E. O. Rounsefell (Laporte Chemicals, Ltd.) said that there was a triumvirate in packaging of the package maker or supplier, the manufacturer who utilised the package, and the consumer. Which of those three should determine the quality or type of a package? **Dr. G. L. Riddell** (Reed Paper Group) believed it was up to the manufacturer of the product to bring the two sides together. He could find out the customer's views by market research. He agreed with the underlying theme of Mr. Richardson's paper that the major factor was cost. Mr. Pilditch commented that some extravagant packs did sell the products.

One speaker criticised paper-sack manufacturers for not producing an easy-opening device for paper sacks, but another speaker, from the Bowater Group, said that his company had worked on the problem and had produced such a device. Despite the fact that its cost was only about one-tenth of a penny per cwt. sack, customers just did not seem interested. **Mr. C. D. Callieu** (Shell Chemical Co., Ltd.) said that the customer had not been consulted. He thought that most firms would welcome such a device. **Mr. T. J. L. Cuthbert** (Unilever, Ltd.) said that it was news to him that Bowater's could offer an easy-opening device.

Mr. A. F. Much (Imperial Chemical Industries, Ltd.) said that Mr. Morris had given him the impression of sneering at the industrial bulk pack as a possible 'silent salesman'. Did he really believe that the bulk pack could not be used as a propaganda medium? In reply Mr. Morris expressed a belief that there could be an improvement in ease of identification that could lead to greater safety in handling.

Another questioner asked if anything had been envisaged that would supersede the metal drum for the export of corrosive liquids. It was suggested by other speakers, in reply, that shipment could be made either in ships' tanks or by means of other forms of transport tankers.

The conference then divided up into four private study groups.

Chemicals from Sea Discussed at Scottish Resources Symposium

CHEMICALS from the sea was the subject of a paper presented by W. C. Gilpin, Technical Director, Steetley Organisation Research Department at a symposium on The Natural Resources in Scotland held at Edinburgh on 31 October to 2 November. Those chemicals obtainable directly from the sea and without the aid of solar evaporation are of most interest. These are magnesium hydroxide, calcium sulphate, potassium salts, bromium salts, calcium and copper. At present only magnesium hydroxide and bromine are produced commercially; the rest can be obtained more easily from sources other than the sea.

The positioning of plants for the production of magnesia from the sea is important. They are best situated where the local sea water has little or no dilution from rivers and where the in-shore currents run parallel to the shore so that spent sea water which has had the magnesia extracted from it will not be recirculated into the plant.

There are 4½ lb. of magnesium chloride and 2 lb. of magnesium sulphate in 100 gall. of sea water. One plant at Hartlepool, the biggest of its kind in the world, produces 150,000 tons of magnesite per annum.

In the early 1930's the discovery of anti-knock petrol enormously increased the demand for bromine so that the annual production has risen from 1,250 tons/year in 1914 to about 100,000 tons/year today, the greatest part of which is taken from the sea.

As with magnesia, considerable care must be taken when selecting a site for a bromine plant for there are huge quantities of spent sea water to be disposed of. Dilution due to other industrial wastes may cause a loss of chlorine which is used in the reaction. The main outlet for bromine is at present the manufacture of ethylene dibromide and so a readily available source of ethylene is essential for the successful operation of a sea water bromine plant.

There is one ton of potassium in every 590,000 gall. of sea water but its recovery is complicated by the presence of about 28 times as much sodium. Dipicrylamine is used in the process, and as it is an expensive compound prepared by nitrating diphenylamine, the completeness of its recovery is important for the successful operation of the process. It is unlikely that any sea water process could compete with a mining and fractional crystallisation process based on reasonably high potassium salt deposits such as sylcite, sylvanite, carnallite polyalite.

New Series of Flexible Epoxy Resins Developed by Union Carbide

A NEW series of low cost, flexible epoxy resins suited to thermal shock-resistance applications has been developed by Union Carbide Chemicals (*Chem. and Eng. News*, 24 October 1960).

The development of these resins brings stannous octoate into a new role as a plastics catalyst. Earlier it has been used as a urethane foam catalyst and also as a catalyst for silicones. The epoxy system is made from Epoxide 201, a dicyclic diepoxy carboxylate, and a long chain di- or tricarboxylic acid, and has a catalyst concentration of 2%. The carboxyl-epoxide ratio varies from 0.3:1 to 0.7:1. Carbide claim that the epoxide monomer and the fatty acid react more quickly than, for example, glycidyl ethers and carboxylic acids. The reaction mixture gels rapidly and exothermally at temperatures between 80° and 100°C, and cross linking takes place.

Resins made on a 2:1 epoxide : carboxyl basis show little change in physical properties after aging at 120°C for 2,000 hours according to Carbide. Resins made from dicarboxylic acids are flexible and resist thermal shock whereas harder resins are produced when a tri-carboxylic acid is used.

Carbide have applied for a patent on the stannous octoate epoxy systems but do not plan to sell the epoxy resins themselves but hope rather to expand their epoxide monomer sales, and in addition may decide to sell the epoxide with the catalyst as a stable mixture. The carboxylic acids would need to be obtained elsewhere.

The Oil Age

(*Continued from page* 811)

Market research must also take into account possible new uses, of which the polymer field will doubtless provide many. One new project concerns the use of asphalt film mulch to conserve moisture in the ground during seed germination. Others must be the fuel cell, the use of oil and gas in blast furnace to produce pig iron, and petroleum coke for electrode manufacture in the aluminium industry.

The future for oil is boundless.

EQUIPMENT NEWS

Chemical Plant : Laboratory Equipment : Control and Indicating Apparatus

VERSATILE SACK-FILLING MACHINE

SIMULTANEOUS filling and weighing of a wide range of materials of varying density is possible with the new Bowater 110 F.S. sack-filling machine. An automatic settling device, or 'posser', is incorporated which allows shorter sacks to be used and increases output rates.

Filling is through a two-speed screw feeder with a brake mechanism controlled by a weigh-beam which locks when the correct weight is attained. This principle permits manual or mechanical settling to be carried out during the main filling cycle without damage to the weighing mechanism.

The automatic valve packing of powdery materials is possible with this machine in circumstances where, either because of lack of headroom or the unsuitability of the material, a conventional valve packer and net weigher would be unsuitable. Suppliers are the Sack Filling Department, Multiwall Sack Division, **Bowater Packaging Ltd.**, Ellesmere Port, Cheshire.

ELECTRIC HEATING MANTLE

An industrial-size electric heating mantle fitted with flameproof mains connections, fire protected by inert-gas purging and also fitted with a spillage protection ring. This equipment was manufactured by Electrothermal Engineering Ltd., 270 Neville Road, London E.7, who produce a range of standard electric heating mantles and control gear for chemical plant, pipework, laboratory apparatus, etc., as well as custom-built equipment such as fire-protected heating mantles for glassware; very high power heating equipment for large tanks, pressure vessels and vacuum vessels; and high power input pipe heating equipment

AMERICAN GAS-TIGHT SYRINGE

A SYRINGE that is gas-tight has been developed by Hamilton Company, Inc., and is now being manufactured in 0.10, 0.25, 0.50, 1, 2, 5 and 10 ml. sizes. The syringes are stated to be leak-proof over a range from 20 mm. to six atmospheres. The plungers have a precisely machined Teflon tip seal that gives a stiff but smooth plunger movement. The body of the plunger is stainless steel, coated with corrosion-resistant Teflon. They are calibrated in millilitres at 20°C, with scales accurate to 1% or better. The gas-tight syringes are ideal for gas chromatography and for pipetting gases and corrosive liquids, particularly liquids which ordinarily cement syringe plungers to the barrel. Literature or additional information is available from **Hamilton Co. Inc.**, P.O. Box 307, Whittier F11, California, U.S.A.

ROTATIONAL VISCOSITY METER

INSTEAD of the usual single-point measurement obtained with many types of viscometers, the rotational viscometer Rheomat 15 yields data of the flow properties of Newtonian, plastic, thixotropic, dilatant and pseudo-plastic materials from which consistency curves characteristic of the type of flow of the material can be plotted. This information frequently aids in the interpretation of the properties of these materials in their various applications.

With the Rheomat 15 it is possible to evaluate the rheological properties of a wide variety of materials such as viscous liquids, resins, pigment dispersions, emulsions, paints, printing inks, adhesives, coating compositions, starch pastes, food and pharmaceutical products, and many others. The viscosity, yield value and thixotropic behaviours of these materials can be measured over a wide range of rates of shear and shearing stresses. The apparatus consists of the indicating rheometer, together with the control cabinet. A 16-position rotary switch gives ready selection of speed, ranging from 5.59 to 352 r.p.m. The Rheomat 115 is manufactured by Centraves A.G., Zurich, the agents in Great Britain being **Short and Mason Ltd.**, Aneroid Works, 280 Wood Street, Walthamstow, London E.17.

LABORATORY HYDROLYSING BATH

THE Electrothermal hydrolysing bath is designed to provide easy handling of microscope slides and coverslips during hydrolysis in Feulgen technique, or any other cytological, physiological, biochemical or histological techniques that require controlled temperatures during staining, etc. Heating is provided direct to the baths at the sides and bottom, and temperature is controlled by a built-in energy controller (for A.C. only) which is fitted with an arbitrary scale. The maximum input is 60 W and an indicator lamp is fitted.

Two glass stain baths are provided and the apparatus is designed to keep them at the desired controlled temperature. With two baths it is possible to 'warm up' the slides in one bath before transferring them to the second, which will then maintain a constant temperature throughout the timed hydrolysis. After the energy controller position has been determined and has been set for

Electrothermal hydrolising bath in use

hydrolysis at 140°F (60°C) the baths require approximately 2 hr. to reach this temperature.

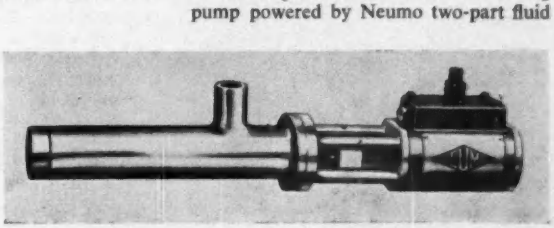
Each bath can accommodate up to 10 slides and is supplied with a thick plastic lid that is sunken to prevent spillage of condensation liquid. The lid has an opening for the thermometer that can be closed if desired. This opening can also be used to suspend a small test tube for hydrolysis of small pieces of tissue—the lip of the tube resting on the rim of the opening. A cover glass carrier that will rest on the bottom of the bath is supplied.

Makers of the apparatus are **Electrothermal Engineering Ltd.**, 270 Neville Road, London E.7.

NEUMO AIR-OPERATED PUMPS

THE calls made on small pumps by industry are extremely varied and the Neumo Supaversal air-operated pump is designed to cater for as many of these requirements as possible. It can be manufactured in any length from the minimum standard length of 8½ in. up to 12 ft.

The Supaversal is a double acting pump powered by Neumo two-part fluid



Neumo Supaversal air-operated pump unit with pump 8½ in long

motors and contains two valves actuated by a combination of light springing and internal liquid pressure; thus they can be operated in any attitude. The valve seals are small, the valve apertures large, and with the flow continuing through the pump, always in the same direction until the final outlet, the pump is claimed to be very suitable for highly viscous liquids and insensitive to dirty liquids. Whilst the Supaversal is of a small capacity, a maximum of 130 gallons per hour, it can be used to deliver liquids up to 1,000 lb. pressure. The centrifugally cast, cast-iron bore sleeve of the pump can be replaced by the user, as of course, can the glands and valves. The detachable main bore sleeve simplifies production, making it possible to supply the pump with various bore sizes; this, coupled with motors of three different sizes, gives an infinite variety of delivery pressures.

A pulsating flow is inherent in a piston type positive displacement pump; an air accumulator is therefore incorporated in the pressure system to smooth the flow.

The Supaversal is economically suitable for manufacturing in difficult materials, that is to say, forms expensive to machine in difficult materials have been avoided.

This new pump has a pick-off point incorporated in the system to receive a device called the Automator, with which the unit becomes completely automatic. The Automator has a chamber sealing a device sensitive to a variance of pressures in a fluid pipe line. This part of the unit, becoming energised by a variation in pipe line pressure, imparts movement to a rod controlling the air supply or, at the same time, electrical supply to the motor.

In the case of an air controlled motor the valve seat controlling the air to the motor (by an arrangement of differential pressure surfaces) is either retained on the seat, cutting off the supply, or is firmly thrust off the seat, resuming the supply. It cannot remain in a neutral or indecisive position.

Makers of these units are **Neumo Ltd.**, Peacehaven, Sussex, who also produce, for corrosives, a larger pump with all parts contacting the acid in Ferobestos. It is basically a standard type of Neumo pump, but some redesigning of component parts was necessitated by the physical properties of Perobestos Heads up to 100 lb. could be considered a satistory rating for this pump, the manufacturers state.

METAL COATING PROTECTS IRON AND STEEL

For the protection of iron and steel from corrosion, a metal coating known as Metalife Duplex is available, this being a two-pack system consisting of a base and a solidifier which are combined to give the metal coating. It is claimed to withstand temperatures from −65 to 400°F dry heat and to be non-toxic.

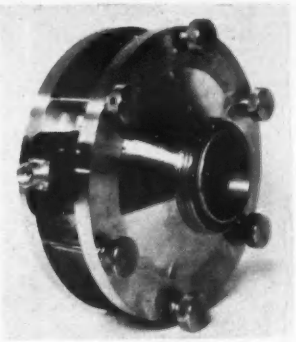
One brushed application gives a double thickness coating, so that where normally four protective coats would be required, only two coats of Metalife Duplex will be needed. It is also stated that the coating is quick drying and can be overcoated in six hours.

According to the manufacturers, **Metalife Liquid Metals Ltd.**, Harrogate, Yorks, the coating can be applied to damp surfaces and, due to its structure, does not sag, drip or run when being applied.

VERSATILE LIQUID METERING UNIT

The Unipulse metering unit can be used independently or as the brain centre of a complete metering system for processes using liquids of different viscosity, acidity, alkalinity and temperature, is available from **Measurement Ltd.** (a Parkinson Cowan company) of Tameside Works, Dobross, Delph, near Oldham. An electromagnetic system is used to transmit liquid flow data to remotely-positioned indicators and control devices. The meter operates on the rotary piston principle, where the piston revolutions are counted electro-magnetically, thus eliminating the need for stuffing boxes, rotary seals, etc. Each time the piston makes one complete revolution, a pulse of induced current is transmitted to the control and indicating equipment.

The design of pick-up used is claimed to have the advantage that signal amplitude remains constant regardless of flow rate and thus gives efficient and accurate



Unipulse liquid meter

operation even at the lowest rate of flow. Additionally, the piston is so dimensioned that each cycle of the piston displaces an exact volume, i.e. a gallon or a decimal fraction of a gallon according to the Unipulse model used. This basic feature enables meter indications to be transmitted in decimal notation without gearing. It is stated that, due to the resultant low friction, head loss across the Unipulse is low and this produces exceptionally good low flow characteristics.

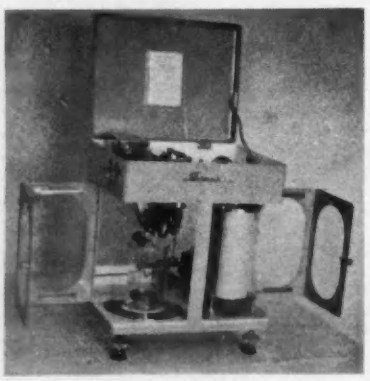
Typical control equipment to which the Unipulse electrical impulses can be transmitted are electro-magnetic counters summating the amount of liquid passed, a series of electro-magnetic counters preset to a batch quantity, Dekatron tubes preset by means of rotary switches or punched cards, a rate of flow indicator, a 100-position circular scale indicator with a 'count-down' and automatic resetting feature or a strip chart recorder possibly embodying electrical or pneumatic on/off, proportional, derivative or integral control facilities. Several Unipulse meters can be arranged to operate one controlling or indicating device on a sequential basis.

SURFACE TEMPERATURE THERMOMETER

Rapid and accurate reading of any surface liquid or gas temperature, is claimed for the MIP Thermeter, produced by **Measuring Instruments (Pullin) Ltd.**, Winchester Street, London W.3. It is described as being very ruggedly constructed, yet at the same time light in weight and easily carried in the pocket. It is available in two types—one scaled at +10°C to +110°C (+50°F to +230°F) and the other at −40°C to +10°C (−40°F to +50°F). The response is approximately 15 sec. from normal ambient, dependent on the heat source capacity and thermal conductivity of the material on which the temperature is being checked. To minimise reading errors in difficult conditions, the anti-parallax scale is used.

Microgap switches have been incorporated and the standard probe, while designed for surface temperature measurement, can be used immersed in most liquids. Alternative probes are available. Reubens/Mallory batteries are used to power the Thermeter.

AUTOMATICALLY RECORDING SEDIMENTATION BALANCE



A new development from Japan, the Shimadzu Sedimentograph, is an automatically recording sedimentation balance for measuring the particle-size distribution of powders. Designed by the Institute for Chemical Research of Kyoto University, this instrument, while extremely sensitive, is essentially simple in design and its mechanism will stand up to continual use by non-technical operatives. The Sedimentograph can measure the particle size of fine powders in a range of from 0.5μ to 150μ using 2-5 grammes of sample powder. Further details are available from Northgate Traders (City) Ltd. at Moorgate House, 366-8 Copthall Avenue, London E.C.2

Overseas News

ESSO AIDS SWEDEN'S ENTRY INTO PETROCHEMICALS FIELD

SWEDEN is entering the petrochemical field for the first time with a steam cracker to be built at Stenungsund by Esso. The cracker will supply two nearby plants which will manufacture polythene and ethylene oxide. Esso has secured a long term contract to supply ethylene from the cracker to the polythene plant which will be jointly owned by Union Carbide and the Swedish firm Fosfatbolaget. Esso will also supply the ethylene oxide plant which will be owned by another Swedish concern with large chemical interests, Mo och Domsjo. The cost of the cracker and the first phase of the other two plants is £13.5 million.

The Esso cracker is designed to process raw materials ranging from gas oil to natural gas and will be supplied from a number of the group's refineries, the nearest of which is at Oslo. The principal products will be ethylene, propylene and butadiene. The ethylene output of the plant, which is the immediate major interest, is not disclosed.

A joint company is being formed by Union Carbide and Fosfatbolaget to run the polythene plant which will have a capacity of about 15,000 tons per year. Know-how will be provided by Union Carbide.

The initial capacity of the ethylene oxide plant will be 10,000 tons a year. The ethylene oxide will be processed at the plant for the production of ethylene glycol and ethylene-based raw material for synthetic detergents.

The steam cracker is expected on stream by mid-1963 and will have an input capacity of 250,000 to 300,000 tons per year.

Union Carbide Plan Propylene Oxide in Sicily

Union Carbide Corporation are planning to build, jointly with Celene of Italy, a plant for the production of propylene oxide, at Priolo near Siracuse, Sicily.

Phthalic Anhydride Project Details Released by S.D.

Scientific Design Company Inc. has received a contract for the engineering and construction of Witco Chemical Co.'s Eastern phthalic anhydride plant. The 30 million lb./year plant will use an S.D. phthalic anhydride process, and is scheduled for completion before the end of 1961. Witco's first phthalic anhydride plant went on stream in Chicago early this year. This 20 million lb./year plant was also designed and constructed by Scientific Design.

Scientific Design Co. also reveal that the first S.D. phthalic anhydride plant using ortho-xylene as initial feedstock is now being designed and constructed for Compagnie Française des Matières Colorantes (Francolor), Villers-St.-Paul, France. Engineering and construction will be performed in France by a member of the S.D. Group, Société Française des Services Techniques. The plant will be designed for ortho-xylene, but will be fully convertible to naphthalene. News of the new S.D. catalyst which makes this type of plant possibe was given in CHEMICAL AGE, 25 June, p. 1067.

The phthalic anhydride plant under construction for Staatsmijnen in Limburg, Geleen, Holland, brings to four the number of S.D. designed phthalic plants utilising an S.D. process.

Large-scale Desalinisation with Nuclear Reactors

A detailed evaluation has been made by the Chemical Engineering Section, Commonwealth Scientific and Industrial Research Organisation of Australia, of available techniques for the desalination of sea-water. With present-day technology it is stated that very large plants with outputs exceeding 40 million gall. per day of water, with by-product electricity, employing nuclear reactors as the heat source, could produce at the cost of 8-9As. per 1,000 gall.

The section has also designed and installed a pilot plant for the hydrogenation of brown coal by the fluid-bed process. The plant uses counter-current contact between coal and hydrogen-rich gas in a 20 ft. deep ballfed fluidised bed.

Dow's Ethenolamines and Glycols Project in Canada

Dow Chemical of Canada have awarded to Brown and Root, Ltd., of Edmonton, Alberta, a contract to construct production facilities for ethenolamines and glycols on its 675-acre Fort Saskatchewan, Alberta, plant site. Construction will start immediately and the facilities are expected to be in production by mid-summer 1961. The ethanolamines from the plant will be sold primarily to gas producers as a sweetening agent for natural gas.

Brown and Root were also awarded a contract recently to build a pentachlorophenol plant at Fort Saskatchewan. This plant is scheduled for completion early next spring.

U.S. Firm Offers Two New Fatty Hydroxamic Acids

Two fatty hydroxamic acids, oleyl- and fatty C-16 C-18-hydroxamic acids, have been made available commercially by Woburn Chemical Corp. of Harrison, New Jersey, U.S. They have a reactive –OH and =NH group, as well as a long chain fatty group and can react with alkalis, metallic ions and acylating agents. Some of the metallic salts are highly coloured. On heating they form isocyanates which can be reacted further with alcohols and amines to form urethanes and ureas respectively. The isocyanates form carbamic acids with water.

S. African Firm Seeks Higher Duty on Stearic Acid

South African Oil Mills (Pty) Ltd., Randfontein, have applied to the Union Government for an increase in duty on stearic acid and/or stearine from 15% *ad valorem* to 15% *ad valorem* plus 1d/lb. weight; for a 15% *ad valorem* duty on tall oil (now free of duty); and for 15% *ad valorem* on oleic acid/oleine (now free of duty).

Stauffer Build Sulphur Dioxide Plant

Consolidated Chemical Industries, a division of Stauffer Chemical, are building a plant at Baton Rouge, La., to produce liquid sulphur dioxide. The plant, with an annual capacity of 10,000 tons, is scheduled for completion late this year.

Rhodesia and Nyasaland Trade in Chemicals

The Federation of Rhodesia and Nyasaland last year imported chemicals and pharmaceuticals worth some £7,010,833, as compared with a figure of £6,861,080 for 1958. The Federation's exports of such products rose in value from £689,241 in 1958 to £711,120 last year. In overall trade the U.K. is the Federation's biggest single supplier and customer.

C.I.L. Plan $3.5 Million Laboratory Expansion

Canadian Industries Ltd. plan a £3.5 million expansion of their central research laboratory at McMasterville, Que, giving a threefold increase in space. Construction is to begin in the spring of 1961 and should be completed by mid-1962.

Government Prospecting Orders for Southern Rhodesian Firms

The Government of Southern Rhodesia have agreed to the remission of all royalty payable on chrome obtained by Rhodesian Cambrai Mines (Private) Ltd., during the year ended 30 September 1960, from their mining location in the Gwelo district. The Government has also granted exclusive prospecting orders to Rio Tinto (S.R.) Ltd., covering 9.8 square miles, in which precious stones and metals and base minerals may be prospected for and where £7,500 must be spent on operations during the next two years.

Johannesburg Consolidated Investment Co. Ltd. may prospect for gold and antimony for two years in an area covering 34.25 square miles where £12.000

must be spent, and Vulcan Minerals (Private) Ltd. may search for precious stones and metals and base minerals for two years in 20.4 square miles where £11,000 must be spent on operations.

It is expected that the first load of concentrates from a pilot scheme to reopen a copper mine in the Headlands district will be despatched to West Germany in the near future.

New U.S. Compound Protects Rubber Against Weather

To protect rubber goods against weather and flex cracking a compound called Ozono has been developed in the U.S., and is described as a synergistic blend of anti-ozonants, anti-oxidants, and anti-suncheck agents. It is claimed to afford better ozone, oxygen, and sun cracking protection than mixtures of commercial anti-ozonants and waxes used separately.

The new compound is produced by Beacon Chemical Industries Inc., of Cambridge, Massachusetts, who are offering it in experimental quantities.

Plastics Industry in Brazil

The plastics industry has been one of the most rapidly developing sectors of Brazilian industry over recent years. It has expanded on an average at the rate of 20% a year. Domestic production by some 130 factories accounts for about 75% of consumption. Following table shows the production of plastics in Brazil over the last 3 years.

	1957	1958	1959
	Metric tons		
Polystyrene	9,980	9,610	8,750
Polythene	—	200	2,700
Urea formaldehyde	5,730	7,240	7,600
Phenol formaldehyde	3,660	5,050	5,950
P.V.C.	6,940	8,400	13,200
Monomer vinyl acetate	—	240	1,530
Caseine glues	1,800	1,750	1,850
Alkyd resins	1,110	1,200	1,300
Styrene	900	3,000	3,800
Various resins	700	750	1,530
Others	270	280	525
Total	31,090	37,720	48,735

Norsk Hydro to Raise Magnesium Output

Norsk Hydro, the leading Norwegian chemical producers, plan to raise magnesium capacity from 14,000 tonnes to 30,000 tonnes annually. Raw materials are sea-water, North Norwegian dolomite, Spitzbergen coal and chlorine from Norsk Hydro's own works.

Sicilian Sulphur Stocks Down

During the 10 months from 1 July 1959 to 30 April 1960, stocks of sulphur in Sicily decreased from 230,000 to 200,000 tonnes.

During the same period, 39,415 tonnes of sulphur were shipped to other countries. This makes an increase of 48% in comparison with the total recorded during the corresponding period of the preceding financial year. The largest importers of Italian sulphur were Greece (16,000 tonnes), France (11,000 tonnes), and Tunisia (4,000 tonnes).

As regards quantities sold in Italy, 39,000 tonnes were assigned to refining and milling (crushing), 20,000 tonnes for the production of carbon disulphide and sulphurous anhydride, while smaller quantities went into the production of sulphuric acid, polysulphides, and sodium sulphide.

Libya Wants to Set Up Petrochemicals Industry

According to Munir Baaba, leader of a delegation of Libyan economic experts at present visiting Federal Germany, Libya is interested in the building up of a local petrochemicals industry. No difficulties will be set in the way of foreign interests wishing to invest in this field in Libya.

Armour Agricultural Plan Expansion Programme

Armour Agricultural Chemical Co. are starting a $60 million expansion programme which includes a plant at Sheffield, Ala., to produce ammonia, ntiric acid, urea, nitrogen solutions, and other ammonia derivatives, and a phosphate plant near Ft. Meade, Fla., to extract and process phosphoric acid and triple super phosphate and to produce sulphuric acid. Several other plants will be built to make liquid mixed fertilisers and bulk blended fertilisers.

Butane from the Sahara

Butane is to be one of the products of a small oil refinery to be constructed in the Hassi Messaoud area of the Sahara desert by the Société Nationale de Récherches et d'Exploitation de Pétrole en Algérie. The company has a 50% interest in the Hassi Messaoud oilfields and will construct the refinery in cooperation with the Compagnie de Raffinage en Afrique du Nord. The refinery, to be opened in mid-1961, will serve local demand.

British-built Nuclear Reactor Goes 'Critical' in Holland

Reactor Centrum Nederland, the Dutch Atomic Energy Foundation, has now put into operation its Jason research and training reactor. The reactor became critical last week, seven months after manufacture commenced at the Hawker Siddeley Nuclear Power factory at Langley, Bucks.

The R.C.N. Jason is the first British reactor to be completed and put into operation in a European Common Market country. Another version is being used for research at the manufacturer's headquarters at Langley, and a third is under construction for the U.K. Atomic Energy Authority.

Shawinigan Ship Phenol in 20,000 Gall. Tank-cars

B.A. Shawinigan Ltd. have started regular trans-Canada shipments of phenol by new 'jumbo' tank-cars. The first of the 20,000 U.S. gall. tank-cars started the regular schedule from the company's Montreal plant to British Columbia, where phenol is used in the manufacture of plywood.

The tank-cars permit shipments more than twice the size of those formerly possible in regular size 8,000 gall. tank-cars. They are the largest of their type built and leased in Canada for trans-Continental service.

Uranium Carbide Shows Promise as Nuclear Material in U.S. Studies

ITS high uranium atom density, good thermal conductivity and irradiation stability give uranium carbide potentialities as an important nuclear fuel material; however, a major problem is the development of an economic method for fabricating the compound on a production basis that will result in the needed compositional control.

Techniques for producing solid uranium carbide bodies are studied at the New Haven, Conn., metallurgical laboratories of the Olin Mathieson Chemical Corporation, U.S., under the sponsorship of the Atomic Energy Commission, and the properties of a powder-produced and cast product are compared. A major emphasis in this research has been placed on the preparation of uranium carbide by reacting uranium metal with hydrogen to form a hydride and, subsequently, reacting the resultant uranium powder with methane or propane.

So far, it appears that in order to produce a high density product from the powder it will be necessary to have a controlled amount of free uranium and, perhaps, significant quantities of oxygen or nitrogen in the material, particularly if cold pressing and sintering techniques are to be resorted to.

Discussing this work at the 42nd National Metal Exposition and Congress in Philadelphia recently, Mr. H. S. Kalish, chief of nuclear metallurgy at the Olin Mathieson laboratories, reported that with suitable quantities of free uranium and the right carbon-oxygen-nitrogen balance, uranium carbide has been produced, on a laboratory scale, with a density approaching theoretical and with properties that appear promising for the necessary fuel material application.

Boots' New Weedkiller Combats Wild Oats Problem

WILD oats constitute the major problem in agriculture in U.K., particularly in the intensive cereal areas in Eastern England. Two species of wild oats are known in this country, *Avena fatua* and *Avena ludovicinia*, both of which have hitherto shown extreme resistance. The presence of wild oats in a crop can reduce yield by as much as 10-50% varying with the degree of infestation. The position has been aggravated over a number of years by the removal of competing broad-leaved weeds by 2,4-D, MCPA and CMPP, and also by the fact that wild oats, like all cereals, respond to nitrogen fertilisers. The loss to British agriculture caused by wild oats has been estimated at £20 million per year.

However, a solution to the problem appears to be in sight with the introduction to this country by Boots of a new selective weedkiller, Avadex. Avadex was developed in the U.S. by Monsanto Chemical Co., and has already been used in Canada with considerable success. Extensive field trials have been carried out in many parts of the U.K. and a consistent 90-100% destruction of the weed has been obtained.

Chemically, Avadex is 2,3-dichloroallyl- di*iso*propylthiol carbamate. The new compound is sprayed onto the bare ground by means of conventional crop spraying equipment and is then harrowed in prior to sowing. No protective clothing need be worn by the operators, and toxicological clearance is anticipated. Avadex kills the young plant soon after germination.

Avadex is being imported from Monsanto in the U.S. and there are no plans at present to manufacture it in the U.K. It will be available in this country in 1961 and its distribution will be controlled through Boots field staff, consisting of 200 technical agents who will call on farmers.

Also in the selective weedkiller field, Boots have introduced Cornox RK, a non-poisonous, non-caustic compound effective against Redshank.

New Range of Lauryl Ether Sulphate

IN the comparatively short time since Cyclo Chemicals Ltd., Manfield House, Strand, London W.C.2, introduced sodium lauryl ether sulphate to the U.K. as Cycloryl NA, this material has become widely used in cosmetic, detergent, plastics, metal cleaning, electroplating and other industries.

Considerable interest has recently been shown in other lauryl ether sulphates such as the potassium, ammonium, calcium, magnesium and triethanolamine salts of lauryl alcohols reacted with, on the average two or three molecules of ethylene oxide, as well as the analagous products based on myristyl alcohol, and these are now being offered on a commercial scale by Cyclo Chemicals. Samples and further details can be obtained on request from the company.

ELECTRICAL RESEARCH ASSOCIATION REPORTS ON CS_2 AND BUTADIENE

RELATION of igniting current to circuit inductance for a mixture of butadiene with air and carbon disulphide vapour with air has been published by the British Electrical and Allied Industries Research Association (Tech. Report D/T 112 and D/T 113 respectively). The investigations described in the reports are part of a series which is being carried out at the Safety in Mines Research Establishment to determine the relative ease of ignition by break sparks of the various inflammable gases and vapours used in industry, in order to group them and choose the representative gases and vapours for test purposes.

The butadiene isomer used throughout the tests was the buta-1:3-diene obtained from the British Hydrocarbon Chemicals Ltd. The results of the tests showed that buta-1:3-diene is less readily ignited by break sparks than ethylene but more easily ignited than pentane and the most ignitable mixture of butadiene with air lies in the range of 4.4-5.9% by volume.

Exactly similar tests carried out on carbon disulphide vapour used Analar purity carbon disulphide obtained from the Laboratory Chemicals Division of British Drug Houses Ltd. In this case the conclusions drawn were that the relation of minimum igniting current to circuit inductance for the most easily ignited mixture of carbon disulphide vapour and air does not differ appreciably from the corresponding relation for the most readily ignited hydrogen/air mixture. The most readily ignited mixture of carbon disulphide vapour in air lies in the range 650-800 mg./l (approximately 23% by volume).

A further report issued by the association is concerned with flameproof enclosures, particularly the effect of internal pressure on the flange gap width at the time of ignition of an external mixture. Tests of the structural strength of the explosion vessels used in the determination of maximum experimental and statistical safe gaps suggest that the safe gaps tabulated for some of the gases in Group IV of B.S.229 may be in error on the safe side owing to a momentary widening of the flange gap during the internal explosion, so that a gap wider than the pre-set experimental safe gap may have existed when the incentive flame failed to pass through and would therefore be the true value of that gap.

It is shown that while the maximum permissible gaps specified for the gases and vapours in Groups I, II and III of the classification are not likely to be inaccurate from this cause, the present methods of clamping together the two halves of the explosion vessel with 1 in. and ½ in. flanges are unsatisfactory for some of the gases in Group IV.

Water Research Association Work Nears Practical Application

SIGNIFICANT proportion of the research carried out by the Water Research Association has been concerned with investigations of a fundamental nature, but an increasing amount of the Association's work is reaching the point of practical application. The fifth Annual Report of the Water Research Association was presented at the Annual General Meeting held on 20 October.

The report states that last year will have been the last full one the Association will spend at Redhill, a year in which the staff have been especially active in field work concerned with members' use of plastics water mains and methods of leak detection.

It is anticipated that the new building at Medmenham will be ready for occupation in the first months of 1961 and it is inevitable that the Association's work will be interrupted during the transfer.

In continuation of the work on coagulation, a detailed study has been made of the effect of synthetic detergents on the coagulation process. The results obtained from the determination of the effect of alkyl aryl sulphonate extracted from various domestic washing powders, on the coagulation of dilute kaolin suspensions was in marked contrast to those obtained from the use of the polyphosphate fraction of washing powders, which produce an appreciable effect at concentrations as low as 1 p.p.m.

The evaluation of pipe made from high impact p.v.c. has been carried out by the apparatus available for long term pressure testing. The work has shown that for pressure water supply the safe working stress for the material is about half that of normal impact p.v.c. in current manufacture, and that the benefits of the high impact strength are reduced by the necessity to have thick walled pipe when compared with normal impact p.v.c. pipe under the same working conditions. Increasing use is being made of unplasticised p.v.c. by water undertakings for mains up to 6 in. in diameter in areas of corrosive soils.

This year's research of the Association is the first of five for which a Government grant is available. As soon as the facilities are ready at Medmenham, existing lines of research will be expanded and new investigations begun. A start will be made in the fields of hydrology and micro-biology.

Britain's Chemical Exports Head for the £300 Million Mark

BRITAIN'S chemical exports in the first nine months of 1960 were valued at a total of £235,841,998, a 10% rise on the same period of last year, when they totalled £213,720,418. The September 1960 figure of £25,898,746 was 13.5% up on September 1959, and was also an improvement on the monthly average of the third quarter, which was £25.27 million. Monthly average for the first half of 1960 was £26.67 million and for the whole of 1959 was £24.42 million.

The third quarter monthly average was 6% up on a year earlier; the second quarter figure was up by 11%, and the first quarter figure showed a rise of 14% up on a year earlier. All the main categories of chemical exports were affected by the slowing up, except for pigments and paints. Shipments of plastics materials in the third quarter were only 2% up on the same period of 1959, after rises of 28% and 13% in the previous two quarters.

If U.K. chemical exports continue at the same rate in the last three months of the year as in the first nine months, the 1960 total will exceed the 1959 total of £293 million by £21 million, thus substantially topping the £300 million mark. The October figures, however, will reflect fully the impact of the stoppage in the London docks.

Chemical imports in the period January-September were valued at £131,059,313, a rise of 33.6% over 1959 when they totalled £98,113,830. The September figure of £14,005,117 was 16.6% up on the September 1959 figure of £12,047,694. The monthly average for the third quarter was £14.52 million; for the first half of 1960 it was £14.58 million and for 1959 was £11.53 million.

The third quarter monthly average was 22% up on a year earlier, while the second quarter figure was higher than a year previously by 32% and the first quarter figure showed a rise of 49%.

Chemical Engineering Problems Solved by Computer

THE way in which a computer is instructed to carry out a calculation and the solutions of several chemical engineering problems were discussed in a paper called 'Computers and their application to chemical engineering' presented by D. W. Holman and J. J. Settle to a meeting of the Institution of Chemical Engineers, North Western Branch, held in Manchester on 25 October.

Computers will carry out step by step any sequence of calculations which is specified to them; they cannot detect errors and, if the computer makes an error, it is usually a big one and it is easily detected. It is wrong to think that computers are suitable for use only on problems, the solutions of which require many man-years of work, or also that much money and effort are necessary to solve these problems. Many mathematicians, physicists, chemists, engineers and statisticians are engaged in preparing computer programmes, not as a full-time job, but as part of their normal occupations.

The authors stated the steps necessary to solve by computer a quadratic equation $y=a+bx+cx^2$. This equation is factorised, $y = (cx+b)x+a$; the best way to obtain y is to multiply c by x, add b, multiply by x and add a. A programme is written for the computer to perform this series of operations and it must be in a code the computer can understand; for example, 210,c means put c into the accumulator which is the part of the computer where calculations are made, 212,x means multiply x by the number in the accumulator, 211,b means add b to the number cx now in the accumulator; 212,x means multiply x by the number obtained by the last operation and 211,a means add a to obtain a value for y which is punched out when the computer receives the order 208,0. Numerical values for a, b, c and x are fed into the computer by means of a punched tape or punched cards. The computer has a device for reading each combination of holes or no holes and each number is stored in a 'memory'.

Today it is not necessary for the programmer to learn the very complex instruction language of his computer because many computers have autocodes that are easy to learn and are essentially algebra and English. These autocodes enable any chemist or engineer to learn in two days how to construct a programme.

Thus, to use a computer a precise knowledge of the calculation is necessary, a step-by-step programme must be written and careful thought is required to apply the knowledge of programme construction.

The value of approximate methods for the calculation of distillation columns for multi-component mixtures is that changes in the data can be made and the effect of the changes in quantities and purities of the distillate of each component can be quickly determined on the computer. Twenty runs of 20 seconds each on the computer will serve to show the economics of demanding excessive purities.

The authors discussed some specific problems and some difficulties met during work with computers.

W. J. BUSH NEW SOCIAL CLUB CANTEEN

Main canteen on the upper floor of the new social club of W. J. Bush and Co. Ltd. at Ash Grove Works, London E.8. The Bush welfare fund, endowed by Mr. Eric Bush, chairman, has provided a number of features for the club which was opened recently by Mrs. Eric Bush. Ground floor houses sports and dancing facilities and the first a billiards room and senior staff dining room

James Anderson's Research Laboratories Opened

RESEARCH and experiment as the key to the acceleration of growth in industry was stressed by Lord Polwarth, chairman of the Scottish Council (Development and Industry), when he opened the new £170,000 laboratories of James Anderson and Co. (Colours) Ltd. on 2 November at Paisley (see also 5 Nov., p. 758).

James Anderson are members of the Geigy group and specialise in the production of organic pigments for the paint, printing and plastics industries. The new laboratories, situated at Hawkshead Road, Paisley, include a laboratory for the preparation of azo dyes, a pigmentation laboratory for the improvement of properties of existing pigments, a phthalocyanine research and development laboratory, as well as laboratories for short range and long range research and those for dealing with problems arising in actual production.

As well as benefiting from research carried out by the parent company, James Anderson work in close co-operation with another branch, Ashburton Chemical Co. Ltd., on new intermediates for pigments. The sales organisation of the Geigy Co. Ltd. deal with technical service enquiries and with the full evaluation of the new products developed in the Paisley Laboratories. About one-third of the production from the Paisley works are exported.

SCIENTIFIC RUSSIAN WITHOUT TEARS

Part 6—Vocabulary (Continued)

By Professor W. J. Perry

(University of Arizona, Tucson, Arizona, U.S.)

PREFIXES constitute another means used very extensively in Russian to alter the meaning of a simple word or basic root. However, the shade of meaning imparted by quite a few of the important prefixes is variable and incapable of precise definition. For this reason, the following list can do no more, for many of the important prefixes, than indicate how they are used to alter the meaning of simple words and roots. Note also that many of these prefixes, when used with verbs, serve to indicate completed action.

без-, бес-	without, - less, un-
в-, во-	in, into
воз-, возо-, вос-, вс-	(1) up, away, off (2) return
вы-	from, within, out of
до-	(1) up to (2) sufficiency
за-	(1) beyond, behind (2) initiation of action
из-, изо-, ис-	away from, out
между-, меж-	between, inter-
на-	toward, onto, to
над-	above, super-, per-
не-	un-, non-
о-, об-, обо-	(1) about, around (2) establishment of condition
от-, ото-	out, away, from
пере-	(1) across, back and forth (2) above, super-
по-	(1) short duration of action (2) in fashion of (3) initiation of action
под-, подо-	(1) under (2) establishment of condition
полу-	semi, half
пред-	before, in front of
при-	near, in vicinity of
про-	through, past
противо-	against, in opposition to
раз-, разо-, рас-	(1) separate, apart, to pieces (2) intensification of action
с-, со-	(1) with, together (2) down, off
у-	(1) establishment of condition or intensification (2) away from.

Space limitation prevents listing a sufficient number of Russian words to illustrate the various shades of meaning imparted by such prefixes. Perhaps the following examples, cited almost at random, may suggest the importance of prefixes in Russian.

бездымный	smokeless	дым	smoke
бескровие бескровность	anaemia	кровь (fem.)	blood
вдыхание	inhalation	дыхание	breathing, respiration
вход	entrance	ход	movement, move, gait
воспламенение	ignition, inflammation	пламя	flame
взлёт	upward flight, take-off	лёт	flight
восстановитель	restorer, reducing agent (chem.)	становить-ставить	to be placing, erecting
вывод	(logical) conclusion	водить	to be leading
выдавление	extrusion	давление	pressure
договор	treaty, agreement	говорить	to be speaking
дополнение	supplement	полный	complete, full
закись (fem.)	lower oxide	кислый	sour, acidic
		окись (fem.)	oxide
заместитель	substituent, deputy (acting as)	место	place
изменение	change, alteration	мена	exchange, barter
испарение	evaporation	пар	vapour, steam
*межатомный	interatomic	*атомный	atomic
международный	international	народ	nation
нагревание	heating (process)	греть-нагреть	to heat, to warm
накипь (fem.)	deposit formed on boiling	кипение	boiling (process)
надокись (fem.)	peroxide	окись (fem.)	oxide
надслуховой	supersonic	слуховой	sonic, aural
невидимый	invisible	вид	form, aspect
неясный	obscure, unclear	ясный	lucid, clear
окисление	oxidation	кислый	sour, acidic
описание	description	писать-написать	to write
объяснение	explanation	ясный	clear, bright
отвод	outlet, removal	водить	to be leading
открытие	discovery	крыть-покрыть	to cover

*перегруппировка	regrouping	*группа	group
перекись (fem.)	peroxide	кислый / окись (fem.)	sour, acid / oxide
поверхность	surface	верх	top, summit
постепенный	gradual, progressive	степень (fem.)	degree, rank
подпись (fem.)	signature	писать-написать	to write
подчинение	subordination	чин	rank, grade
полужидкий	semi-liquid	жидкий	liquid (adj.)
*полупериод	half period	*период	period (e.g. of vibration)
предсказание	prediction	сказать	to tell, to say
предписание	prescription, direction, order	писать-написать	to write
приблизительный	approximate	близкий	near
присутствие	presence	суть	are
проводник	conductor	водить	to be leading
проявитель	developer	явный	evident, distinct
противодействие	counteraction	действие	action
противоядие	antidote	яд	poison
расстояние	distance (apart)	стоять-постоять	to stand, to halt
расширение	expansion	широкий	wide, broad
современный	contemporary	время	time
сопротивление	resistance	против	against
удаление	removal	дальний	distant
ускорение	acceleration	скорый	fast, rapid

Enough has been said to make the point that a relatively small number of basic units (roots, suffixes and prefixes) serve in Russian to generate a large number of derived words. This fact can be exploited to very good advantage when acquiring sufficient vocabulary to read scientific Russian.

The relationship between words is sometimes obscured by replacement of one consonant by another as follows:

г	ж (or з)	д	ж	д	жд	з	ж	к	ч (or ц)
с	ш	ст	щ	т	щ / ч	х	ш	ц	ч

These consonant shifts may be illustrated as follows:

многий / множество	many / multiplicity	вода / обезвоживание	water / dehydration
свобода / освобождение	liberty / liberation	близкий / приближение	near / approximation
наука / научный	science / scientific	мысль (fem.) / промышленность	thought / industry
место / замещение	place / replacement (process)	краткий / сокращение	short / abbreviation
свет / просвечивание	light / translumination	успех / успешный	success / success, successful

конец / конечный — end, terminal / final, ultimate

Similarly, certain vowel shifts in roots are worthy of observation, as follows:

o or e deleted or inserted

о	а	ь	е	й	
о	е	у	ы		
ы	и	й	ь		

Note the following examples:

брать / выбор	to be taking / choice, election	город / гражданство	city, town / citizenship
дерево / древесный	wood / wooden	голос / соглашение	voice / agreement, contract
война / военный	war / military, martial	один / соединение	one / compound (chem.)
сухой / высыхание	dry / desiccation	полезный / использование	useful / utilisation
итти / найти	to be going / to find	искать / взыскивать-взыскать	to be seeking / to exact, to claim.

PEOPLE in the news

● The Nobel prize for chemistry has been awarded to **Professor Willard Libby,** age 51, for inventing the carbon-14 method of determining age in archeology, geology and other branches of science. Professor Libby worked on the first atomic bomb and was a member of the U.S. Atomic Energy Commission from 1954 to 1959.

● **Mr. Albert S. Hester,** associate editor in charge of the London office of the American Chemical Society, is leaving the A.C.S. at the end of November to take up a post as European operations manager for Robert S. First Inc., industrial consultants. He will be succeeded in London by **Mr. David Gushee,** an associate editor of *Chemical and Engineering News* in Washington. Mr. Gushee with Mr. Hester and **Dr. Richard Kenyon,** editorial director of A.C.S. applied publications, has been touring the Continent.

● U.K. Atomic Energy Authority have announced the senior appointments in the Development and Engineering Group. **Mr. R. V. Moore, G.C.,** formerly director of reactor design, and **Dr. H. Kronberger, O.B.E.,** formerly director of research and development, have been appointed as deputy managing directors. **Mr. P. T. Fletcher, C.B.E.,** will be deputy managing director, General Management. Mr. Moore will be deputy managing director, Projects; and Dr. Kronberger will be deputy managing director, Development. **Mr. S. Fawcett,** formerly deputy director, has succeeded Mr. Moore as director of reactor design.

The Research and Development Directorate at Risley has been divided into two Executive directorates. **Dr. H. K. Hardy** and **Mr. F. W. Fenning** have been appointed respectively as director of fuel element development and director of reactor technology.

These appointments take effect from 10 October 1960.

● **Mr. J. L. Fletcher** has been appointed manager of the General Chemicals Division, Cyanamid of Great Britain Ltd. Previously connected with the paint and plastics industries, he will be responsible for the bulk sales of Cyanamid's chemical products in the United Kingdom which will include, in the New Year, the sales direction for melamine crystal production from the company's new Gosport plant. Mr. Fletcher is now visiting ing American Cyanamid Company in the United States and will return to London in mid-December.

J. L. Fletcher

● The Dyestuffs Committee of the Association of British Chemical Manufacturers have appointed **Mr. H. Blackshaw,** now retired after 40 years' service with Imperial Chemical Industries Ltd. (Dyestuffs Division) and its predecessors, to succeed **Mr. F. Schofield** as technical dyestuffs adviser. He will commence his new duties at the Dyestuffs Office, Board of Trade, Manchester, on 28 November.

● **Professor J. M. Robertson, F.R.S.,** Gardiner Professor of chemistry and administrative head of the chemical laboratories in the University of Glasgow, has been awarded the Royal Society Davy Medal for his distinguished pioneering work on analysis of crystal structure, especially of organic compounds.

● Managing director of Reed Plastic Packaging Ltd., the new company, will be **Mr. F. J. Clark** (a director of Albert E. Reed and Co. Ltd. and chief executive of the Reed Packaging Division). Other directors will be **Mr. R. F. Seddon, Mr. J. H. Seddon** (the founders of Polythene Drums Ltd.); **Mr. L. G. Groves** (general manager of the Reed Packaging Division development department); **Mr. J. B. Purkis** (commercial executive of the Reed Packaging Division); and **Mr. J. W. O'Field** (at present a director of Polythene Drums Ltd.).

● **Mr. J. W. Bewley** has been appointed a director of British Glues and Chemicals Ltd.

Correction

In 29 October issue of CHEMICAL AGE the changes in the A. Boake, Roberts and Co. Ltd. organisation were published on this page. The name of the chief chemist appeared incorrectly. He is in fact **Dr. B. Dudley Sully.**

Obituary

Mr. W. J. Piggott, who retired from the board of Laporte Industries Ltd. last year after nearly 52 years of service, has died at the age of 67. He began his career in 1907 as office boy at the chemical works of Bernard Laporte in St. Ann's Road, Luton. In 1922, while still a comparatively young man, he was appointed secretary of the company and held this office for 27 years, during which time he maintained a remarkable interest in every respect of the company's activities. In 1944 he became a director of the parent company and a number of subsidiaries. When he retired he had been with Laporte longer than anybody and watched it grow from a small concern into a group of companies with assets of £19 million.

H. C. Tett, chairman and managing director of Esso Petroleum Co. **(see p. 815)**

Packaging of Chemicals Discussed by Institute of Transport

PACKAGING and its place in transport was discussed by Mr. G. Shepherd, assistant packages adviser, I.C.I. dyestuffs division, when he addressed the Merseyside and District Section of the Institute of Transport, at Liverpool, on 6 October. He said that chemical producers had to bear in mind (a) the cost of the package, including reconditioning if it is capable of two or more trips; (b) the cost of warehousing and handling; (c) the cost of freight, particularly in export traffic.

One of the greatest developments in the packing of chemicals in recent years had taken place in the use of multiwall paper sacks; the paper sack had now emerged as a package in its own right and not merely as a substitute for other packages. The development of plastics containers for use in place of glass carboys made it possible to reduce freight charges considerably and the savings in freight were sufficient to offset the high initial cost of the container.

The hazards of any journey could be divided into five main groups: loading and unloading, movement while contained in vehicles, warehousing, climatic hazards and pilferage. The principal hazard during movement in road transport vehicles were vibration and bouncing of the load. In the U.K. this was not a hazard of great importance, but in some of the less developed countries, roads were frequently very poor and both vibration and bouncing could become major hazards.

Commercial News

- **Balfour Current Prospects Improved**
- **E.N.I. Petrochemicals Output Increased**
- **Victor Blagden Recommend Merger**
- **Guinness May Get 60% of Crookes Shares**

Henry Balfour

The foreshadowed rights issue by Henry Balfour and Co. is to be on a two-for-five basis at 12s 6d per 5s share. The directors state that the group profit after tax for year ended October 31 will not be less than £93,000 (£92,124). A final 11½% is forecast, making 18% for the year.

The directors feel that prospects for the current year are better than in the previous two years and correspondingly profits are likely to be higher. In the absence of unforeseen circumstances it is intended to maintain the dividend on the capital as increased by present issue for the current year at the same rate of 18% as for the previous year on the old capital.

E.N.I. Group

Annual report of the E.N.I. Group activities has been published. Turnover, excluding inter-Group company sales, amounted to Lit. 361,100 million which is 16% more than the previous year.

Petrochemicals output was still higher in 1959 and all was placed on the home market or exported. The erection of new units in A.N.I.C.'s large petrochemicals plant at Ravenna has meant increased capacity. Once the scheduled building programme, which reached a very advanced stage in 1959, is completed, annual production will be something like 1 million tons of nitrogenous and complex fertilisers and 90,000 tons of synthetic rubber.

A company associated with A.N.I.C., Societa Chimica Ravenna, initiated hydrochloric acid and vinyl chloride production in 1959 and has nearly finished building units for manufacturing polyvinyl chloride. Also at Ravenna, A.N.I.C. have interests in the production of carbon black.

Cooper, McDougall

Cooper, McDougall and Robertson are to pay an interim of 10%, to be paid on 31 October and the board does not intend to recommend any further distribution on ordinary in respect of the year ended 31 August 1960.

Courtaulds Ltd.

Courtaulds Ltd. have declared an interim dividend of 10d. per £1 unit of ordinary stock, less tax, in respect of the year ending 31 March, 1961, to be paid on 20 December. Group profit before tax is £9,569,000 (£9,154,000).

Blagden and Co. Merger

The directors of Victor Blagden and Co. Ltd. and London Containers and Noakes Ltd. announced that it is proposed to recommend to their shareholders a merger of the interests of the two companies. If the proposals are approved, it is intended that there should be a holding company with the name of Blagden and Noakes (Holdings) Ltd., which would be responsible for the management of the entire group but would not be a trading company, the existing companies trading under their own name. It is proposed that the merger should become effective from 1 January 1961.

Kirklees Ltd.

"Satisfactory results" from the Chemicals Division of Kirklees Ltd. were reported by Mr. William Tong, chairman, in his annual report. Kirkose products were now well established over a wide field at home and abroad. New products resulting from lengthy research and development were now nearing the point of production on a commercial scale.

Crookes Laboratories

If the offer of Arthur Guinness, Son & Co., and Philips Electrical Industries for the capital of Crookes Laboratories becomes effective, Guinness will own 60% and Philips 40% of the shares acquired. Trading results of Crookes to date indicate that if the present trend of sales is maintained, profit for the year to end on 31 March next will show an improvement over the previous year.

McKechnie Brothers

Group profit of McKechnie Brothers for the year ended 31 July was £1,369,592 (£943,834). Tax took £598,940 (£326,783) and group net profit was £770,652 (£617,051). A final dividend of 12½% is recommended, making 17½% (15%). A special tax-free distribution of 5% is to be paid out of non-taxable profits (same).

NEW COMPANIES

POLYCELL MANUFACTURING CO. LTD. Cap. £10,000. Objects: To acquire such part of the assets and undertaking of Polycell Products Ltd. in the U.K., and elsewhere as comprises the manufacturing and production activities now carried on by the said company, and in particular the manufacture and production of the products known as Polycell, Polyfilla, Polypeel and Polyline. Directors: J. Shaw and R. F. Inch. Reg. office: 73 Highgate Road, Kentish Town N.W.5.

R. MASON CHEMICALS LTD. Cap. £5,000. Industrial chemists, consultants, lecturers, manufacturers of and dealers in chemical and metallurgical products, etc. Directors: R. Mason, J. Roy. Reg. office: Whinfield Coke Works, Rowlands Gill, Co. Durham.

Market Reports

TRADING WELL MAINTAINED IN ALL AREAS

LONDON New business on home account has been satisfactory for the period, whilst contract deliveries to the main consuming industries, in the aggregate, have been fairly substantial. The movement in agricultural chemicals has been restricted by adverse weather conditions.

The price position is little changed and the undertone generally is firm. Resulting from the removal of import duty anhydrous borax, prices have been lowered by £10 10s/ton, the new quotation being £58 10s/ton in paper bags and £59 10s/ton in sacks.

Apart from pitch, which is only moderately active, there is a steady demand for creosote oil, cresylic acid and most of the coal tar products.

MANCHESTER Prices for heavy chemical products generally have been well maintained during the past week and a fair weight of new business has been placed by home industrial users, much of it extending over the early months of next year. Shippers have also been in the market on a moderate scale. In the meantime, existing commitments are being drawn against reasonably well on both home and export accounts.

There has been little change on balance in the position of the tar products section and steady outlets are being found for available supplies of most lines, including cresylic and carbolic acids, naphthalenes and xylols.

SCOTLAND Except for a tendency to quietness in certain sections of industry, on the whole the level of trading has been well maintained during the past week. Most of the usual range of industrial chemicals have been fairly well demanded and, again, those pertaining to the textile and allied industries have been featured well.

Prices have remained more or less unchanged, although it has yet to be seen what reaction may result from the recent increases in some of the road transport rates; however, it is pleasing to report a reduction in the prices of all grades of acetic acid.

There is still a good volume of enquiries being received for the export market and conditions here are still showing considerable interest.

TRADE NOTES

Melamine Formaldehyde Resins

British Oxygen Chemicals Ltd. have recently revised their technical service bulletins dealing with the use of melamine both for textile finishes and for paper manufacture. The bulletins, 4 and 5 respectively, both contain an introduction on the nature and uses of melamine, the preparation of the particular resins required and the methods of application.

Pechiney Saint-Gobain Concessionaires

Arising from the recent merger of Société Pechiney and Société Saint-Gobain in France, a new company has been formed under the name Produits Chimiques Pechiney Saint-Gobain, to act as sole distributors of the chemical and plastics products of the combined concerns.

The new company has appointed K. W. Chemicals Ltd., London, as exclusive selling concessionaires in the U.K. and Eire.

Standard Joints for Glassware

All production at the Stone (Staffs) factory of Quickfit & Quartz Ltd., manufacturers of interchangeable laboratory apparatus, is now being produced to the revised British Standard for conical ground-glass joints. Sizes of the joints have been changed slightly to bring Quickfit apparatus into line with the new international standard. The changes are slight and will not effect the marriage of the older type of Quickfit joint with the new.

Borax Price Reductions

Borax Consolidated Ltd. have announced that from 2 November anhydrous borax has been freed from import duty and the scheduled prices of Dehybor are consequently being reduced to take effect immediately. The reduction of £10 10s per ton brings the price of 1 ton in paper bags to £58 10s and 1 ton in hessian sacks to £59 10s, carriage paid in U.K. There is no change in the prices of other grades of borax.

Substantial ocean freight increase is due to take effect from 1 January 1961 and further price adjustment may then be necessary.

I.C.I. Turquoise Blue Dye

The latest addition to the Procion H range of I.C.I. dyestuffs is the reactive turquoise blue dye, Procion Brilliant Blue H5G. The new dye is applied by the normally recommended recipes for Procion H dyes, and its greatest value is expected to be in continuous dying processes.

New Industrial Cleaners

A liquid detergent, which in its various forms can be used in cold or hot fresh water or sea water and which in mixing requires no stirring, is claimed to be strong enough for the heaviest industrial cleaning and will not remove paint or harm the skin. Dasco Kleen is manufactured in the U.K. by D. A. Stuart Oil Co. (G.B.) Ltd., 11a Albemarle Street, London W.1, a wholly owned subsidiary of the Amber Group.

Dasco Kleen is available in several types: Dasco Kleen 403 is an all purpose industrial cleaner for removing caked grime, grease, oils, soot and carbon stains from machinery, floors and ceilings; Dasco Kleen 407 (Germicidal) is a combined machine-tool cleaner and bactericide, and Dasco Kleen 416 is for degreasing. An all purpose marine cleaner is also available.

Amphoteric Surface Active Agents

The Swedish principals, Liljeholmens Stearinfabriks AB, of Guest Industrials Ltd., 81 Gracechurch Street, London E.C.3, have now made available in the U.K. three surface active agents of the amphoteric family—the potassium salts of lauryl amino propionic acid, coco amino propionic acid and oleyl amino propionic acid. These ampholytes have application in many fields including detergents, paints and printing inks and textile and leather industries.

Plastic Filters

Plastic Filters Ltd. will on 10 November move from their existing premises at Park Terrace East, Horsham, to a new 7,000 sq. ft. factory on the Foundry Lane Industrial Estate, Horsham (Horsham 60121/2). The move has been necessitated by a greatly increased volume of work. With additional staff and re-equipped factory, the firm will now be able to offer our customers a more efficient service.

Versatile Intermediate

Now made available for the first time in commercial quantities to European customers by Du Pont de Nemours International S.A., is a new chemical, 1,4-dichlorobutene-2, which is offered as an intermediate in such fields as resin adhesives, fungicides, drugs and veterinary medicines, protective coatings, resins, textile treating agents and electroplating chemicals. It is a colourless liquid that can be mixed with a wide variation of aliphatic, aromatic and chlorinated solvents, but is insoluble in ethylene glycol, glycerine and water.

It is stated that the new intermediate has proved successful in a variety of syntheses, including those of unsaturated diether, diesters, diamines, dinitriles, diimides, diurethanes and dithiocyanates.

New Telephone Number

From 31 October, the telephone number of Turner Brothers Asbestos Co. Ltd., 14 Finsbury Circus, London E.C.2, will be changed to London Wall 5471.

Seam-Welding Described

Further information on Circomatic seam-welding machine introduced recently by Rockweld Ltd., Commerce Way, Croydon, has been published in a brochure. It gives details of Circomatic welding for storage tank construction, a specification of the machine, table of technical data, and illustrations of the Circomatic in use and typical specimens of welds.

Reagent for Iron

Monograph No. 41 (1960) in the Hopkin and Williams series of organic chemical reagents describes the use of 4:7-diphenyl-1:10-phenanthroline, a reagent for iron. The compound reacts with ferrous iron in the pH range 2 to 9 to give the bright red complex *tris*-(4:7-diphenyl-1:10-phenanthroline)-iron(II). The reagent is used in analysis in alcoholic or aqueous solutions.

DIARY DATES

MONDAY 14 NOVEMBER

C.S.—Cambridge: Univ. Chemical Lab., Lensfield Rd., 5 p.m. 'Electrophilic substitution in heteroaromatic nitrogen compounds', by Dr. J. Ridd.

C.S.—Durham: Science Labs., Univ., 5 p.m. 'Some antibiotics derived from actinomycetes', by Prof. A. W. Johnson

C.S.—Leicester: Univ., 4.30 p.m. 'Optical rotatory dispersion in structural organic chemistry', by Prof. W. Klyne.

TUESDAY 15 NOVEMBER

C.S. with R.I.C.—Middlesbrough: Constantine Tech. Coll., 8 p.m. 'Micro-organisms at work', by A. E. James.

C.S.—Nottingham: Chem. Dept., Univ., 5 p.m. 'Some aspects of chemistry of fluorine', by Prof. M. Stacey.

R.I.C.—London: Shell-Mex Hse., Strand, W.C.2, 6.30 p.m. London Section a.g.m.

WEDNESDAY 16 NOVEMBER

C.S.—Dublin: Chem. Dept., Univ. Coll., 5.30 p.m. 'Problems in chemistry of natural products', by Dr. T. B. H. McMurry.

I.Chem.E.—Leeds: Lecture Theatre A, Houldsworth School, 6.30 p.m. 'Electrical hazards in chemical industry', by F. Clark.

Inst. Metal Finishing—London: Festival Hall, S.E.1, 9.30-4.30 p.m. Symposium on 'Nickel-chromium plating'.

Plastics Inst.—Newcastle: Eldon Grill, Grey St., 7 p.m. 'Processing and properties of polypropylene', by C. D. Wells.

Plastics Inst.—Wolverhampton: Victoria Hotel, 7.30 p.m. 'Survey of reinforced laminates', Part II: Epoxides'.

THURSDAY 17 NOVEMBER

C.S.—Aberystwyth: Edward Davies Chemical Labs Univ. Coll., 5.15 p.m. 'Raman spectroscopy', by Dr. D. A. Long.

C.S.—Bristol: Chem. Dept., Univ., 5.15 p.m. 'Forensic science', by Dr. F. G. Tryhoon.

C.S. with R.I.C. & S.C.I.—Edinburgh: Heriot-Watt Coll., 7.30 p.m. 'Polymerisation in aromatic solvents', by Prof. G. M. Burnett.

S.C.I. with R.I.C.—Preston: Town Hall, 7.30 p.m. 'Solvent extraction processes for separation of irradiated nuclear fuels', by B. F. Warner.

C.S.—Salford: Royal Tech. Coll., 5 p.m. 'Reaction mechanisms', by Prof. E. D. Hughes.

C.S. with R.I.C.—Swansea: Chem. Dept., Univ. Coll., 5.30 p.m. 'Chemical control of plant growth', by Prof. R. L. Wain.

Soc. Inst. Tec.—Fawley: Admin. Bldg., Esso Refinery, 5.30 p.m. 'Spectrophotometers', by R. A. C. Isbell.

FRIDAY 18 NOVEMBER

C.S.—Glasgow: Chem. Dept., Univ., 4 p.m. 'Some photochemical reactions', by Prof. D. H. R. Barton.

Plastics Inst.—Birmingham: James Watt Memorial Inst., Gt. Charles St., 6.30 p.m. 'New developments in cellular plastics', by A. Cooper.

Plastics. Inst.—Liverpool: Exchange Hotel, 7.30 p.m. 'Plastics in packaging', by G. Swift.

R.I.C.—Cambridge: Univ. Chemical Lab., Lensfield Rd., 8.15 p.m. 'Gastronomic chemistry', by Dr. A. McM. Taylor.

S.C.I.—Lancaster: Coll. of Further Education, 7.30 p.m. 'Structural relationships in polysaccharide group—some recent developments', by Prof. E. L. Hirst.

S.C.I.—London: 14 Belgrave Sq., S.W.1, 6.30 p.m. 'Physicochemical aspects of chemotherapy', by Prof. J. F. Danielli.

S.C.I.—London: 14 Belgrave Sq., S.W.1, 6.30 p.m. 'Pharmacy—art or science?', by Prof. W. H. Linnell.

NEW PATENTS

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Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 14 December

Process for improving the mechanical properties of polyvinyl chloride and products obtained by the process. Compagnie de Saint-Gobain. **856 365**

Process for the production of p-amenophenol from nitrobenzene. Imperial Chemical Industries Ltd. **856 366**

Esters of amino alcohols. Robins Co. Inc., A. H. **856 453**

Antioxidant composition and its use. Ethyl Corporation. **856 458**

Carbamic acid derivatives. Cassella Farbwerke Mainkur AG. **856 460**

Methods of distillation. General Electric Co. **856 489**

Converter system for liquefied gases. British Oxygen Gases Ltd. **856 217**

Stabilisation of trichloroethylene. Canadian Industries Ltd. **856 285**

Aromatic diamines and their use as protectants for oxidisable unsaturated organic materials. United States Rubber Co. **856 286**

Explosive compositions. United Kingdom Atomic Energy Authority. **856 287**

Preparation of olefins. Du Pont of Canada Co. Ltd. **856 288**

Stable alkaline metal solutions containing carboxymethyl dextran. Commonwealth Engineering Co. of Ohio. **856 292**

Substituted bicyclo-alkanes and alkenes. Boehme, W. R., and Nichols, J. **856 295**

Cross-linked polymer compositions. Goodrich Co., B. F. **856 301**

Diamino derivatives of dimeric aromatic hydrocarbons. National Distillers & Chemical Corporation. **856 313**

Process for preparing pigmented polyethylene compositions. Union Carbide Corporation. **856 314**

Solutions of acrylonitrile polymers. Chemstrand Corporation. **856 315**

Isolation of Rauwolfia alkaloide and salts thereof. Penick & Co. S.B. **856 316**

Process for polymerising isoprene. Triggs, W. W. (Goodyear Tire & Rubber Co.). **856 317**

Polyurethane compositions. Du Pont de Nemours & Co., E. I. **856 318**

4, 4'-bis (benzimidazol-2-yl)-stilbene. Sterling Drug Inc. **856 319**

Siloxane elastomers. Rhone-Poulenc. [Addition to 835 790.] **856 321**

Heterocyclic compounds and methods for producing same. Parke, Davis & Co. **856 352**

Process for the preparation of aromatic-group VIB transition metal carbonyl compounds. Ethyl Corporation. **856 354**

N-substituted azepines and dihydroazepines and processes for their preparation. Geigy AG, J. R. **856 355**

2-aryl-hexahydroquinolizines. Merrell & Co., W. S. **856 357**

Process for the manufacture of 4-amino-isoxazalidone-(3). Hoffman-La-Roche & Co., AG, F. **856 393**

Treatment of vulcanised rubber. United States Rubber Co. **856 243**

Process for obtaining D (—)-alpha-hydroxy-beta, beta-dimethyl-gamma-butyrolactone. Nopco Chemical Co. **856 395**

Method of preparing borazoles. United States Borax & Chemical Corporation. **856 399**

Process for the preparation of cyclopropanecarboxylic acids of trans-form. Rhone-Poulenc. **856 400**

Method and means for the transportation of liquefied natural gas. Couch International Methane Ltd. **856 088**

Polymers with organic solvent and water solubility. National Starch & Chemical Corporation. **856 403**

Process of preparing salt-free N-acyl taurines. General Aniline & Film Corporation. **856 404**

Pyridazine derivative and its process of preparation. Chimie et Atomistique. **856 409**

Method for the preparation of alkoxyalkyl esters of *p*-methoxycinnamic acid. Givaudan & Cie S.A., L. **856 411**

Method for separating N-hydrocarbons using molecular sieves. California Research Corporation. **856 334**

Open to public inspection 21 December

Process for the purification of uranium salts. Bretscher, E., Feather, N., Halban, Von H. H., and Kowarski, L. **856 921**

High molecular weight copolymers of olefins and process for their preparation. Montecatini. **856 733**

Heterocyclic vat dyestuffs. General Aniline & Film Corporation. **856 803, 856 804, 856 805**

Thermo-setting masses of high chemical resistance and a process for their manufacture. Farbwerke Hoechst AG Vorm. Meister, Lucius, & Brüning. **856 806**

Preparation of normally solid crystalline polymers of propylene. Du Pont de Nemours & Co., E.I. **856 626**

Analysis of gases. United Kingdom Atomic Energy Authority. **856 628**

Water-insoluble azo-dyestuffs and process for producing same on the fibre. Farbwerke Hoechst AG Vorm. Meister, Lucius, & Brüning. **856 929**

Device for converting gaseous or liquid hydrocarbons. Gerhold, M. **856 933**

Substituted piperidines. Sterling Drug Inc. **856 587**

Process for preparing polymers and copolymers of vinyl chloride. Farbwerke Hoechst AG Vorm. Meister, Lucius, & Brüning. **856 913, 856 818**

Process for preparing polyolefins. Farbwerke Hoechst AG Vorm. Meister, Lucius, & Brüning. **856 815**

High molecular weight vinyl-aromatic hydrocarbon-maleic anhydride copolymers and process for their preparation. Dow Chemical Co. **856 594**

Recovery of polymers from solution thereof and polymers so recovered. Phillips Petroleum Co. **856 577**

Preparation of pyrolidinone. Rohm & Hass. **856 822**

Quaternising polymers. Phillips Petroleum Co. **856 580**

Linear unsaturated high-molecular-weight polymers and process for preparing them. Montecatini. **856 734**

Preparation of block copolymers. Rohm & Haas Co. **856 581**

Dyestuffs of the anthraquinone series. Ciba Ltd. **856 553**

Process for the purification of pyrethrin extracts. Olin Mathieson Corp. **856 734**

Grafting of monomers to hydrogen-containing high-polymeric materials. Oster, G. **856 884**

Process for preparing high-purity uranium values from uranium ore concentrates. Union Carbide Corp. **856 827**

Process and an apparatus for the continuous preparation of linear polycondensation products. Onderzoekingsinstituut Research N.V. **856 915**

Porous and cellular materials. Montecatini. [Addition to 810 023.] **856 735**

Method of blending rubber latex and bitumen. Benson, J. R. **856 637**

Process for the preparation of polypropylene. Sun Oil Co. **856 565**

Polymers of alkyl 3,4-epoxy-2-hydroxyalkanoates. Union Carbide Corp. [Addition to 834 029.] **856 643**

Aluminium titanium chloride composition. California Research Corp. **856 644**

Polymerisation of olefins. California Research Corp. **856 645**

Process for cross linking polymeric compositions. Cabot Inc., G. L. **856 833**

Substituted anilides and the preparation thereof. Smith, A. E. W. **856 710**

Process for the manufacture of polyvinyl formals. Wacker-Chemie GmbH. **856 840**

Percholoroethylene and hydrogen chloride manufacture. Diamond Alkali Co. **856 664**

Synthetic polyesters and products formed therefrom. Du Pont de Nemours & Co., E. I. [Addition to 826 248.] **856 917**

Manufacture of boron trihalides other than boron trifluoride. United States Borax & Chemical Corp. **856 987**

Thiazole-monoazo-benzene dyestuffs. Imperial Chemical Industries Ltd. **856 898**

Production of glutamic acid and intermediates therefor. Du Pont de Nemours & Co., E.I. **856 848**

Production of finely divided solid hydrolysis products of organosilanes. Farbenfabriken Bayer AG **856 522**

Polyethylene compositions pigmented with carbon black. Union Carbide Corp. **856 524**

Phenthiazine derivatives. Rhone-Poulenc. **856 529**

Penicillin preparations. Horner Ltd., F. W. **856 501**

Polymers and their preparation. International Polaroid Corp. **856 861**

Quinoline quinone derivatives. Farbenfabriken Bayer AG. **856 505**

Thermoplastic material. Montecatini. **856 793**

Oxidation process for the preparation of saturated aliphatic mono-carboxylic acids. [Divided out of 837 321.] **856 962**

Organoboron compounds and methods of making same. United States Borax & Chemical Corp. **856 856**

Method of producing boron trialkyls. Kali-Chemie AG. **856 857**

Monoalkoxy-triaziridinoquinones. Farbenfabriken Bayer AG. **856 508**

Reforming hydrocarbons. Esso Research & Engineering Co. **856 918**

Process for the polymerisation of diolefins. Stamicarbon N.V. **856 858**

Ethylene-1-olefin copolymers and process for producing same. Union Carbide Corp. **856 859**

Polymerisation of diolefins. Goodyear Tire & Rubber Co. **856 863**

Preparation of α-aminolactams. Stamicarbon N.V. **856 967**

2-Dimethylaminoethanol salts. Shionogi & Co. Ltd. **856 707**

Separating lactams from acid reaction mixtures. Stamicarbon N.V. **856 968**

Process for the production of solid thermoplastic synthetic materials. Henkel & Cie GmbH. [Divided out of 843 361.] **856 970**

Ethylene/propylene copolymers. Montecatini. [Divided out of 856 733.] **856 736**

Ethylene/butene copolymers. Montecatini. [Divided out of 856 733.] **856 737**

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